

GENERAL CONSTRUCTION NOTES:

1.

A PRE-CONSTRUCTION MEETING IS REQUIRED WITH THE CONTRACTOR'S FIELD SUPERVISOR PRIOR TO BEGINNING CONSTRUCTION. CONTACT PAM COUCH, FORT BELVOIR DIRECTORATE OF PUBLIC WORKS BY PHONE AT 703-806-3406 OR BY EMAIL AT PAMELA.J.COUCH2.CIV@MAIL.MIL TO SCHEDULE A MEETING PRIOR TO BEGINNING CONSTRUCTION.
2.

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION, AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DIFFERENCES FOUND.
3.

THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRE-CONSTRUCTION MEETING WITH THE OWNER, OWNER'S AGENT, AND ENGINEER PRIOR TO BEGINNING CONSTRUCTION.
4.

THE CONTRACTOR WILL FURNISH ALL SURVEYING AND STAKING FOR CONSTRUCTION TO ASSURE PROPER LOCATION OF PROJECT COMPONENTS. ALL SURVEYING AND STAKING SHALL BE PERFORMED BY A CERTIFIED LAND SURVEYOR. ALL ADA ACCESSIBILITY IMPROVEMENTS PROPOSED/ SHOWN ON THE PLAN INCLUDING BUT NOT LIMITED TO PARKING SPACES, AISLES, ROUTES AND SLOPES, MUST COMPLY WITH THE LATEST ADA STANDARDS FOR ACCESSIBLE DESIGN AND VIRGINIA USBC.
5.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE ALL EXISTING PROPERTY MARKERS. IF DISTURBED, REPLACEMENT MUST BE BY A CERTIFIED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.
6.

ALL CLEARING LIMITS SHALL BE ADEQUATELY MARKED FOR APPROVAL BY OWNER'S AGENT BEFORE CLEARING IS TO BEGIN. CERTAIN TREES MAY BE MARKED AS REQUIRING TREE PROTECTION. THE CONTRACTOR SHALL FENCE THESE TREES IN ACCORDANCE WITH THE TREE PRESERVATION PLAN.
7.

THE CONTRACTOR SHALL KEEP WORK AREAS FREE OF DEBRIS AND HAZARDOUS MATERIAL TO THE SATISFACTION OF THE OWNER'S AGENT.
8.

THE CONTRACTOR SHALL COORDINATE STORAGE OF MATERIALS, PARKING OF VEHICLES, AND RESTRICTIONS OF WORK WITH THE OWNER'S AGENT.
9.

THE CONTRACTOR SHALL COORDINATE WITH THE LOCAL UTILITY COMPANIES PRIOR TO CONSTRUCTING PORTIONS OF WORK IMMEDIATELY ADJACENT TO UTILITY STRUCTURES. THE COSTS OF POLE AND/OR OTHER STRUCTURE STABILIZATION DURING WORK SHALL BE BORNE BY THE CONTRACTOR.
10.

ALL WORK SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE OWNER'S AGENT.
11.

ITEMS DESIGNATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETELY UNLESS OTHERWISE NOTED. REMNANTS MAY BE BURNED/BURIED AND OTHERWISE DISPOSED OF ON SITE ONLY UPON APPROVAL BY OWNER'S AGENT AND LOCAL AUTHORITIES.
12.

THE CONTRACTOR SHALL CALL "MISS UTILITY" OF CENTRAL VIRGINIA AT 811 OR (800) 552-7001 AT LEAST 48 HOURS PRIOR TO THE START OF ANY EXCAVATION. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL VERIFY LOCATION AND ELEVATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON PLANS IN AREA OF CONSTRUCTION. IF THERE APPEARS TO BE A CONFLICT, AND UPON DISCOVERY OF ANY UTILITY NOT SHOWN ON THE PLAN, IMMEDIATELY NOTIFY THE ENGINEER. CONTRACTOR SHALL PROVIDE OWNER'S AGENT WITH COPY OF CLEARED "MISS UTILITY" TICKET.
13.

THE CONTRACTOR SHALL OBTAIN A "DPW EXCAVATION PERMIT" FROM THE DIRECTORATE OF PUBLIC WORKS PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES. CONTACT MS. JANET LOWER BY PHONE AT 703.806.3925 OR BY EMAIL: JANET.L.LOWER.CIV@MAIL.MIL FOR INFORMATION ON OBTAINING A "DPW EXCAVATION PERMIT"
14.

THE CONTRACTOR SHALL PAY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS AND DELIVER COPIES TO THE OWNER'S AGENT AT THE PRE-CONSTRUCTION MEETING.
15.

VERTICAL DATUM IS BASED ON MEAN SEA LEVEL (USC & GS DATUM). HORIZONTAL CONTROLS ARE BASED ON VIRGINIA STATE PLANE COORDINATE GRID, SOUTH ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83).
16.

THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES AND REQUIREMENTS FOR ACCESSIBILITY OF DISABLED PERSONS.
17.

ALL STRUCTURAL FILL OR EMBANKMENT MATERIAL SHALL HAVE A MINIMUM CBR VALUE OF TEN (10).
18.

GEOTECHNICAL REQUIREMENTS TO ADDRESS THE PLACEMENT AND COMPACTION OF FILL AND BACKFILL MATERIALS. THIS SHALL INCLUDE LIFT THICKNESSES, ACCEPTABLE DEGREE OF COMPACTION, SUITABILITY OF MATERIALS, FREQUENCY OF TESTING, AND SHALL BE AS THE GEOTECHNICAL REPORT.
19.

UPON CONSTRUCTION COMPLETION, A CONSTRUCTION RECORD DRAWING FOR PERMANENT STORMWATER MANAGEMENT FACILITIES PLAN SEALED BY A VIRGINIA PROFESSIONAL ENGINEER MUST BE SUBMITTED, CERTIFYING THAT STORMWATER MANAGEMENT FACILITIES HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THIS APPROVED PLAN. SUBMIT TO VA DEQ AND FORT BELVOR DPW-ENRD ON A CD. DPW-ENRD ALSO REQUIRED 1 HARDCOPY FOR FILE RECORDS.
20.

CONTRACTOR TO BE AWARE THERE IS A POSSIBLE BUT LOW PROBABILITY OF ENCOUNTERING MUNITIONS. ON-CALL SUPPORT WILL BE NEEDED TROUGH FORT BELVOIR'S 55TH EOD UNIT.

UTILITY NOTES:

1.

THE UTILITY INFORMATION SHOWN ON THESE PLANS IS TAKEN FROM INFORMATION PROVIDED BY AN UNDERGROUND UTILITY DESIGNATING AND LOCATING COMPANY AND IN SOME CASES, FROM INFORMATION RECEIVED FROM THE UTILITY COMPANIES. THE FORT BELVOIR DIRECTORATE OF PUBLIC WORKS DOES NOT GUARANTEE THAT THE UTILITY INFORMATION SHOWN ON THE PLANS IS COMPLETE OR ACCURATE. THE CONTRACTOR MUST VERIFY THE UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
2.

ALL EXISTING UNDERGROUND UTILITIES SHALL BE MARKED IN THE FIELD BY MISS UTILITY PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING THE FIELD MARKING OF UTILITIES WITH MISS UTILITY.
3.

ALL EXISTING UNDERGROUND UTILITIES SHALL BE PHYSICALLY LOCATED BY THE CONTRACTOR PRIOR TO THE BEGINNING OF ANY CONSTRUCTION IN THE VICINITY OF THESE UTILITIES.

STORM SEWER NOTES:

1.

A WATERTIGHT CONNECTION SHALL BE MADE AT ALL PIPES ENTERING DRAINAGE STRUCTURES. IN ADDITION, WATERTIGHT CONNECTIONS SHALL BE MADE BETWEEN SECTIONS OF PIPE.
2.

LENGTHS OF PIPE SHOWN ON THE DRAWINGS ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
3.

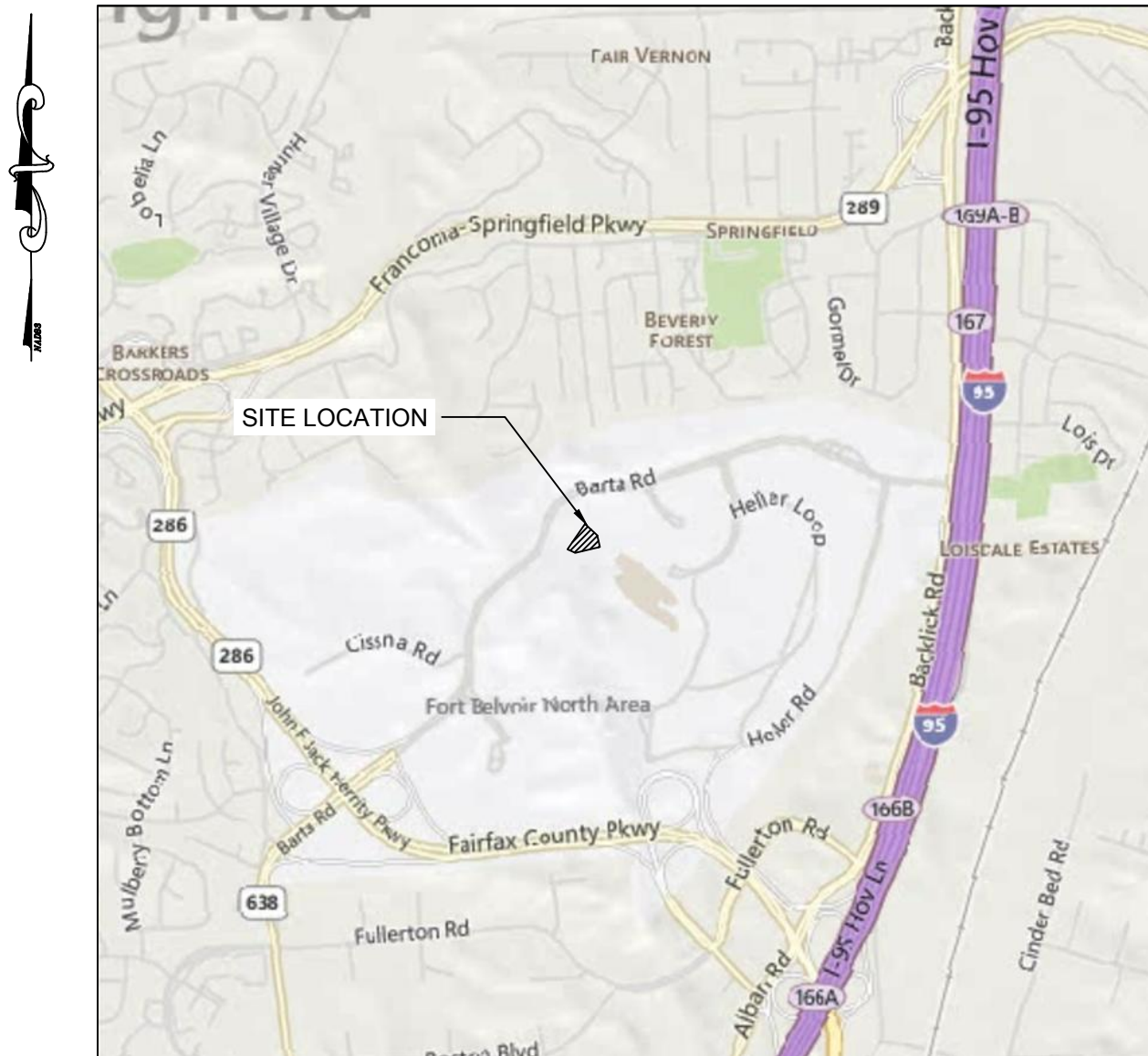
INVERT ELEVATIONS SHOWN ON THE DRAWINGS ARE TAKEN AT THE FACE OF THE STRUCTURE.
4.

SHAPE THE INVERTS OF ALL STRUCTURES ACCORDING TO VDOT STANDARDS IS-1.
5.

STORM SEWER AND CULVERT PIPE SHALL BE REINFORCED CONCRETE PIPE TO CONFORM TO THE CURRENT AASHTO DESIGNATION M170, UNLESS OTHERWISE DESIGNATED ON THE PLANS. CLASS III PIPE WILL BE REQUIRED WITHIN THE LIMITS OF VDOT RIGHT-OF-WAY, UNLESS OTHERWISE NOTED.
6.

MINOR FIELD ADJUSTMENTS IN THE ELEVATION AND ALIGNMENT OF THE STORM SEWER AND STRUCTURE MIGHT BE NECESSARY TO MEET EXISTING CONDITIONS AND PROPOSED GRADING. THE CONTRACTOR SHALL NOTIFY THE FORT BELVOIR DIRECTORATE OF PUBLIC WORKS PRIOR TO MAKING ANY NECESSARY ADJUSTMENTS.

# FORT BELVOIR NCE RECREATIONAL FACILITY FORT BELVOIR NORTH AREA FORT BELVOIR , VIRGINIA



VICINITY MAP

SCALE: 1" = 2,000'

## 100% SUBMISSION

TMG CONSTRUCTION

SEPTEMBER 11, 2015

### Sheet List Table

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C2.2	EROSION & SEDIMENT CONTROL NOTES & DETAILS
C2.3	EROSION & SEDIMENT CONTROL NOTES & DETAILS
C2.4	EROSION & SEDIMENT CONTROL NOTES & DETAILS
C2.5	SOILS IDENTIFICATION MAP
C3.0	LAYOUT AND UTILITY PLAN
C4.0	GRADING AND DRAINAGE PLAN
C4.1	STORM PROFILES AND CALCULATIONS
C4.2	STORM PROFILES AND CALCULATIONS
C5.0	PRE & POST DEVELOPED DRAINAGE
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C6.4	BMP PROFILES AND DETAILS
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L1.1	L1.1 LANDSCAPE DETAILS AND NOTES
E-1	ELECTRICAL SYMBOLS, DETAILS & NOTES
E-2	ELECTRICAL SITE PLAN
23	ELECTRICAL SITE PLAN

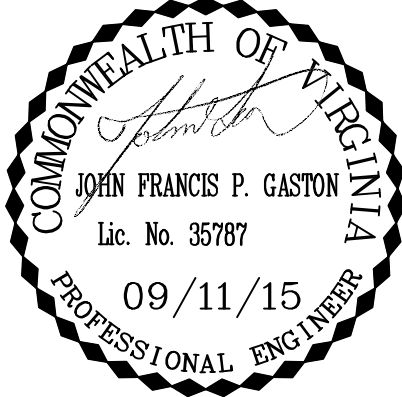
U.S. ARMY GARRISON, FORT BELVOIR  
DIRECTORATE OF PUBLIC WORKS

PLAN APPROVAL FOR  
SEDIMENT AND EROSION CONTROL  
NCE RECREATIONAL FACILITY  
FORT BELVOIR, VIRGINIA

DIRECTOR'S SIGNATUREAPPROVAL DATE

I HEREBY CERTIFY THAT THE EROSION AND SEDIMENT CONTROL DESIGN REFLECTED ON THIS PLAN SET, SHEETS C4.0 THROUGH C4.3 COMPLY WITH THE REQUIREMENTS OF THE FORT BELVOIR MS-4 REGISTRATION STATEMENT DATED MARCH 28, 2013.

DATE



THIS DRAWING PREPARED AT THE  
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REVISION DESCRIPTION
35% SUBMISSION
RESPONSE TO COMMENTS/ 95% SUBMISSION
RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15
RESPONSE TO COMMENTS ON 100% SUBMISSION

DATE
04/29/15
06/23/15
07/16/15
09/11/15

DATE
6/23/15

DRAWN BY
KG
DESIGNED BY
KG
CHECKED BY
JG
SCALE
SEE PLAN

TIMMONS GROUP

NCE RECREATIONAL FACILITY

FT BELVOIR, VA

COVER SHEET

JOB NO.
36145
SHEET NO.
C0.0

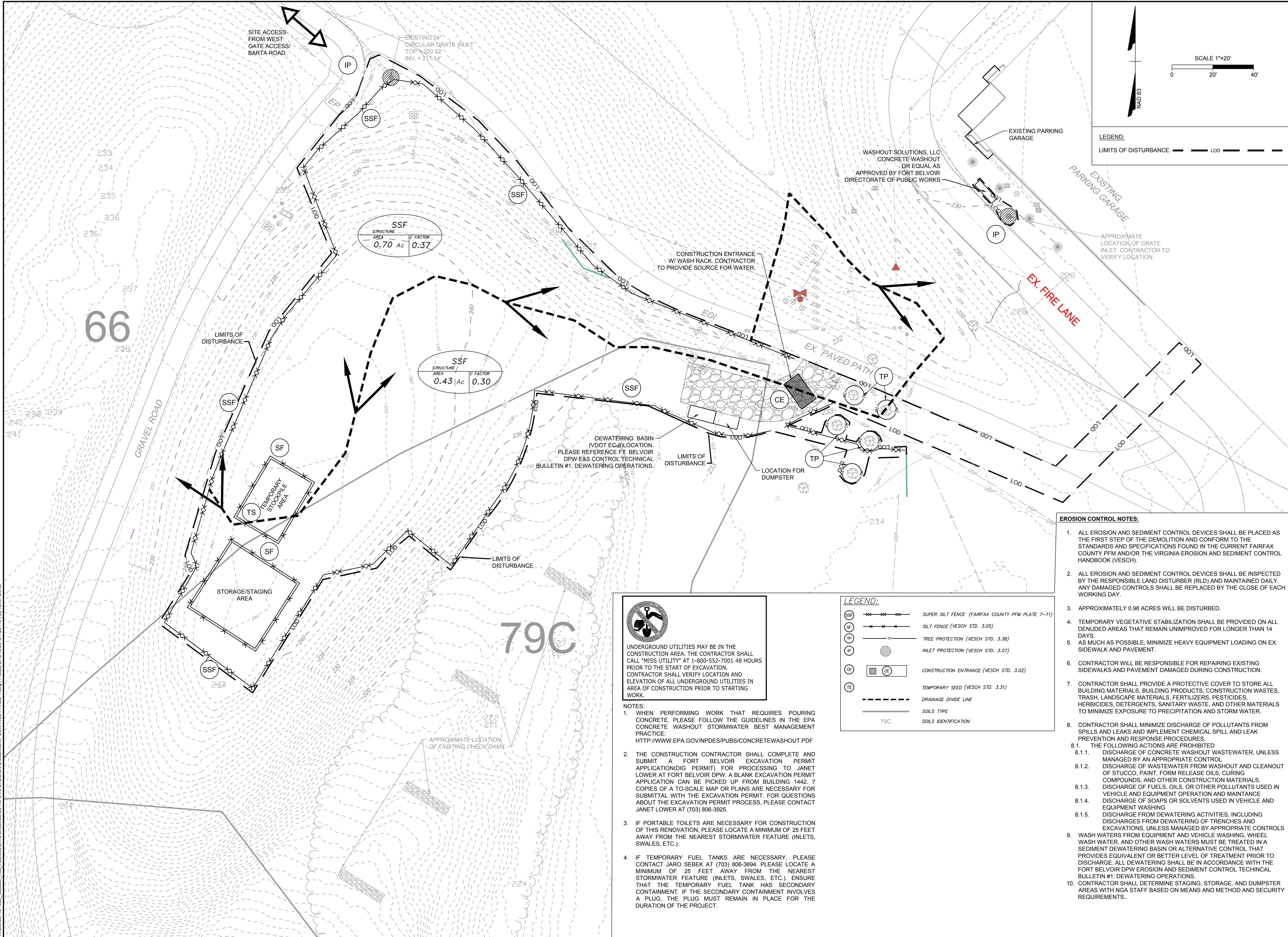
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COMMONWEALTH OF VIRGINIA

JOHN FRANCIS P. GASTON

Lic. No. 35787

09/11/15

PROFESSIONAL ENGINEER

THIS DRAWING PREPARED AT THE

NORTHERN VIRGINIA OFFICE

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TIMMONS GROUP

NCE RECREATIONAL FACILITY

FT BELVOIR, VA

EROSION & SEDIMENT CONTROL PHASE 1

JOB NO.

36145

SHEET NO.

C2.0

EROSION CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PLACED AS THE FIRST STEP OF THE DEMOLITION AND CONFORM TO THE STANDARDS AND SPECIFICATIONS FOUND IN THE CURRENT FAIRFAX COUNTY PFM AND/OR THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).

2. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSPECTED BY THE RESPONSIBLE LAND DISTURBER (RLD) AND MAINTAINED DAILY. ANY DAMAGED CONTROLS SHALL BE REPLACED BY THE CLOSE OF EACH WORKING DAY.

3. APPROXIMATELY 0.96 ACRES WILL BE DISTURBED.

4. TEMPORARY VEGETATIVE STABILIZATION SHALL BE PROVIDED ON ALL DENUDED AREAS THAT REMAIN UNIMPROVED FOR LONGER THAN 14 DAYS.

5. AS MUCH AS POSSIBLE, MINIMIZE HEAVY EQUIPMENT LOADING ON EX. SIDEWALK AND PAVEMENT.

6. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIRING EXISTING SIDEWALKS AND PAVEMENT DAMAGED DURING CONSTRUCTION.

7. CONTRACTOR SHALL PROVIDE A PROTECTIVE COVER TO STORE ALL BUILDING MATERIALS, BUILDING PRODUCTS, CONSTRUCTION WASTES, TRASH, LANDSCAPE MATERIALS, FERTILIZERS, PESTICIDES, HERBICIDES, DETERGENTS, SANITARY WASTE, AND OTHER MATERIALS TO MINIMIZE EXPOSURE TO PRECIPITATION AND STORM WATER.

8. CONTRACTOR SHALL MINIMIZE DISCHARGE OF POLLUTANTS FROM SPILLS AND LEAKS AND IMPLEMENT CHEMICAL SPILL AND LEAK PREVENTION AND RESPONSE PROCEDURES.

8.1. THE FOLLOWING ACTIONS ARE PROHIBITED

8.1.1. DISCHARGE OF CONCRETE WASHOUT WASTEWATER, UNLESS MANAGED BY AN APPROPRIATE CONTROL

8.1.2. DISCHARGE OF WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS, AND OTHER CONSTRUCTION MATERIALS.

8.1.3. DISCHARGE OF FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTANCE

8.1.4. DISCHARGE OF SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING

8.1.5. DISCHARGE FROM DEWATERING ACTIVITIES, INCLUDING DISCHARGES FROM DEWATERING OF TRENCHES AND EXCAVATIONS, UNLESS MANAGED BY APPROPRIATE CONTROLS

9. WASH WATERS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS MUST BE TREATED IN A SEDIMENT DEWATERING BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER LEVEL OF TREATMENT PRIOR TO DISCHARGE; ALL DEWATERING SHALL BE IN ACCORDANCE WITH THE FORT BELVOIR DPW EROSION AND SEDIMENT CONTROL TECHNICAL BULLETIN #1: DEWATERING OPERATIONS.

10. CONTRACTOR SHALL DETERMINE STAGING, STORAGE, AND DUMPSTER AREAS WITH NGA STAFF BASED ON MEANS AND METHOD AND SECURITY REQUIREMENTS..

LEGEND:

SSF

SF

TP

IP

CE

TS

---

79C

SUPER SILT FENCE (FAIRFAX COUNTY PFM PLATE 7-11)

SILT FENCE (VESCH STD. 3.05)

TREE PROTECTION (VESCH STD. 3.38)

INLET PROTECTION (VESCH STD. 3.07)

CONSTRUCTION ENTRANCE (VESCH STD. 3.02)

TEMPORARY SEED (VESCH STD. 3.31)

DRAINAGE DIVIDE LINE

SOILS TYPE

SOILS IDENTIFICATION

UNDERGROUND UTILITIES MAY BE IN THE CONSTRUCTION AREA. THE CONTRACTOR SHALL CALL "MISS UTILITY" AT 1-800-552-7001 48 HOURS PRIOR TO THE START OF EXCAVATION. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION PRIOR TO STARTING WORK.

NOTES:

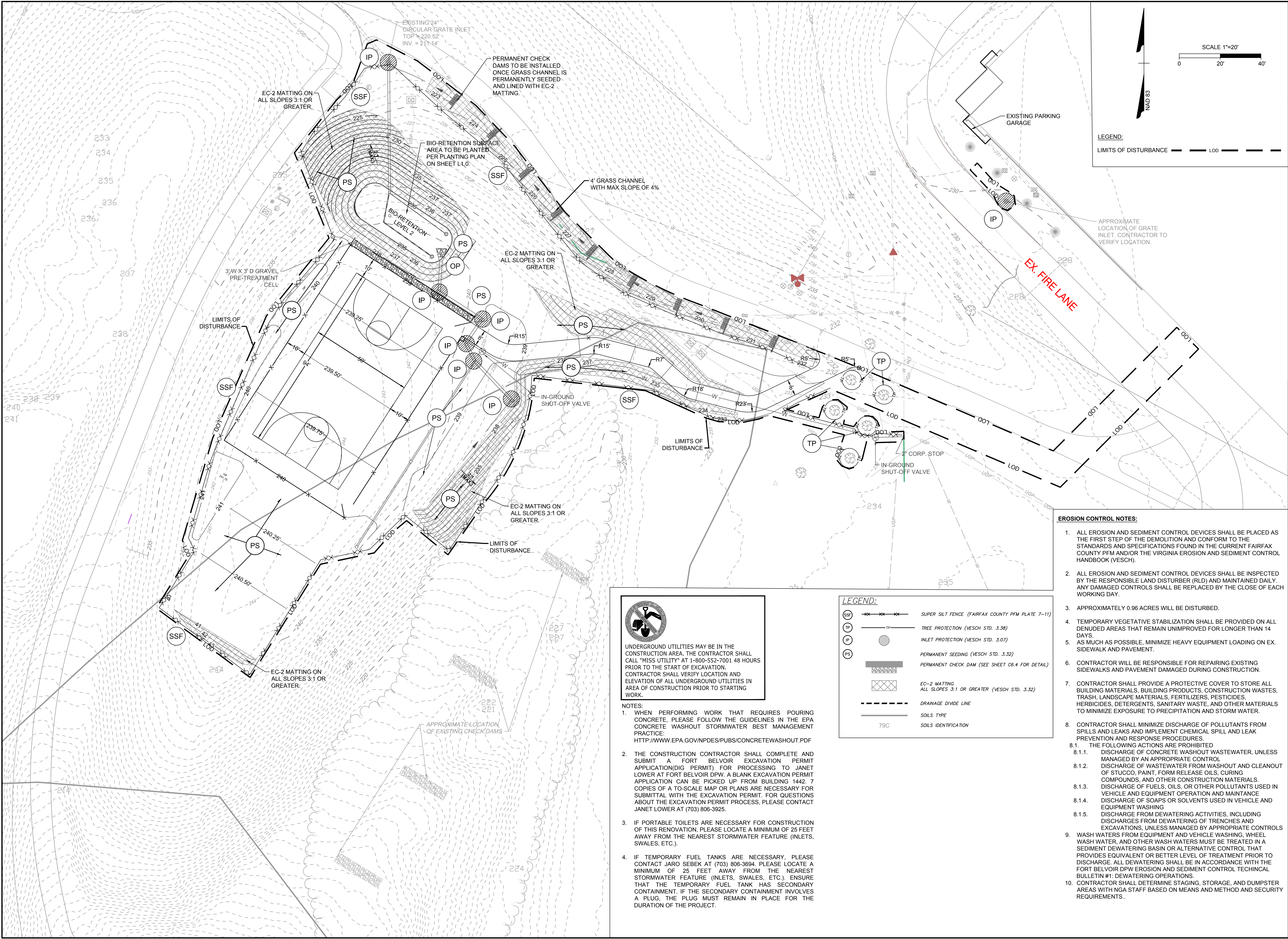
1. WHEN PERFORMING WORK THAT REQUIRES POURING CONCRETE, PLEASE FOLLOW THE GUIDELINES IN THE EPA CONCRETE WASHOUT STORMWATER BEST MANAGEMENT PRACTICE: [HTTP://WWW.EPA.GOV/NPDES/PUBS/CONCRETEWASHOUT.PDF](http://www.epa.gov/npdes/pubs/concretewashout.pdf)

2. THE CONSTRUCTION CONTRACTOR SHALL COMPLETE AND SUBMIT A FORT BELVOIR EXCAVATION PERMIT APPLICATION(DIG PERMIT) FOR PROCESSING TO JANET LOWER AT FORT BELVOIR DPW. A BLANK EXCAVATION PERMIT APPLICATION CAN BE PICKED UP FROM BUILDING 1442. 7 COPIES OF A TO-SCALE MAP OR PLANS ARE NECESSARY FOR SUBMITTAL WITH THE EXCAVATION PERMIT. FOR QUESTIONS ABOUT THE EXCAVATION PERMIT PROCESS, PLEASE CONTACT JANET LOWER AT (703) 806-3925.

3. IF PORTABLE TOILETS ARE NECESSARY FOR CONSTRUCTION OF THIS RENOVATION, PLEASE LOCATE A MINIMUM OF 25 FEET AWAY FROM THE NEAREST STORMWATER FEATURE (INLETS, SWALES, ETC.).

4. IF TEMPORARY FUEL TANKS ARE NECESSARY, PLEASE CONTACT JARO SEBEK AT (703) 806-3694. PLEASE LOCATE A MINIMUM OF 25 FEET AWAY FROM THE NEAREST STORMWATER FEATURE (INLETS, SWALES, ETC.). ENSURE THAT THE TEMPORARY FUEL TANK HAS SECONDARY CONTAINMENT. IF THE SECONDARY CONTAINMENT INVOLVES A PLUG, THE PLUG MUST REMAIN IN PLACE FOR THE DURATION OF THE PROJECT.





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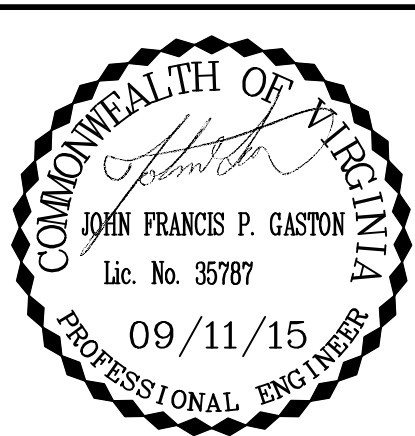
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LEGEND:

- |     |                 |  |
|-----|-----------------|--|
| SSF | ---X---X---X--- | SUPER SILT FENCE (FAIRFAX COUNTY PFM PLATE 7-11)         |
| TP  | ---TP---        | TREE PROTECTION (VESCH STD. 3.38)                        |
| IP  | ---IP---        | INLET PROTECTION (VESCH STD. 3.07)                       |
| PS  | ---PS---        | PERMANENT SEEDING (VESCH STD. 3.32)                      |
|     | ---PS---        | PERMANENT CHECK DAM (SEE SHEET C6.4 FOR DETAIL)          |
|     | ---PS---        | EC-2 MATTING ALL SLOPES 3:1 OR GREATER (VESCH STD. 3.32) |
|     | ---PS---        | DRAINAGE DIVIDE LINE                                     |
|     | ---PS---        | SOILS TYPE   |
|     | ---PS---        | SOILS IDENTIFICATION                                     |

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    - 8.1.4. DISCHARGE OF SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING
    - 8.1.5. DISCHARGE FROM DEWATERING ACTIVITIES, INCLUDING DISCHARGES FROM DEWATERING OF TRENCHES AND EXCAVATIONS, UNLESS MANAGED BY APPROPRIATE CONTROLS
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6/23/15

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KG

DESIGNED BY  
KG

CHECKED BY  
JG

SCALE  
SEE PLAN

**TIMMONS GROUP**

NCE RECREATIONAL FACILITY  
FT BELVOIR, VA

EROSION & SEDIMENT CONTROL PHASE 2

JOB NO.  
36145

SHEET NO.  
C2.1

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EROSION AND SEDIMENT CONTROL NARRATIVE:

PROJECT DESCRIPTION:  
THE PROPOSED PROJECT, LOCATED IN THE FORT BELVOIR NORTH AREA NEAR THE EXISTING NGA BUILDING AND PARKING GARAGE, CONSISTS OF THE CONSTRUCTION OF A BASKETBALL COURT, WALKWAY FOR ACCESS TO BASKETBALL COURT, STORM DRAINAGE THAT WILL TREAT PROPOSED AND POSSIBLE FUTURE USES OF THE AREA. THE TOTAL PROPOSED DISTURBED ACREAGE IS 0.96 ACRES.

EXISTING SITE CONDITIONS:

THE EXISTING SITE IS AN OPEN SPACE AREA WITH EX. UTILITIES LOCATED DOWNHILL FROM THE PROPOSED SITE. THE EXISTING TOPOGRAPHY CONSISTS OF SLOPES RANGING FROM 3% TO 10% LOCATED WITHIN THE LIMITS OF CONSTRUCTION. CURRENTLY THE DRAINAGE IS SPLIT INTO NORTH AND EAST AREAS. THE PROPOSED PROJECT WILL HONOR THE NATURAL DRAINAGE DIVIDES WITH SOME MODIFICATIONS. THE EXISTING SITE CONSISTS OF A PATROL ROAD AND EXISTING PAVED PATH TO THE WEST AND NORTHERN BORDERS.

ADJACENT AREAS:

THIS PROJECT IS BORDERED BY THE NGA PARKING GARAGE TO THE NORTH AND THE NGA BUILDING TO THE EAST. SOUTH OF THE SITE IS THE ACCOTINK CREEK.

OFF-SITE AREAS:

NO OFFSITE AREAS WILL BE DISTURBED BY THIS DEVELOPMENT.

SOILS:

SOIL CATEGORIES CONSIST OF 66 (KINGSTOWNE SANDY CLAY LOAM) & 79C (NATHALIE GRAVELLY LOAM). SEE SHEET C2.4 FOR TABULATED SOILS INFORMATION.

CRITICAL AREAS:

THERE ARE NO CRITICAL SLOPES WITHIN THE LIMITS OF CONSTRUCTION.

EROSION AND SEDIMENT CONTROL MEASURES:

UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCCH). THE MINIMUM STANDARDS OF THE VESCH SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE.

3.02 TEMPORARY STONE CONSTRUCTION ENTRANCE: A STONE PAD, LOCATED AT POINTS OF VEHICULAR INGRESS AND EGRESS ON A CONSTRUCTION SITE, TO REDUCE THE SOIL TRANSPORTED ONTO PUBLIC ROADS AND OTHER PAVED AREAS.

3.05 SILT FENCE: A TEMPORARY SEDIMENT BARRIER CONSTRUCTED OF POSTS, FILTER FABRIC AND, IN SOME CASES, A WIRE SUPPORT FENCE, PLACED ACROSS OR AT THE TOE OF A SLOPE OR IN A MINOR DRAINAGE WAY TO INTERCEPT AND DETAIN SEDIMENT AND DECREASE FLOW VELOCITIES OF DRAINAGE AREAS OF LIMITED SIZE, APPLICABLE WHERE SHEET AND RILL EROSION OR SMALL CONCENTRATED FLOWS MAY BE A PROBLEM. MAXIMUM EFFECTIVE LIFE OF 6 MONTHS.

3.05 SUPER SILT FENCE: SUPER SILT FENCE SEDIMENT BARRIERS SHALL BE INSTALLED DOWNSLOPE OF AREAS WITH MINIMAL GRADES TO FILTER SEDIMENT-LADEN RUNOFF FROM SHEET FLOW AS INDICATED.

3.07 STORM DRAIN INLET PROTECTION: THE INSTALLATION OF VARIOUS KINDS OF SEDIMENT TRAPPING MEASURES AROUND DROP INLETS OR CURB INLET STRUCTURES PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA; LIMITED TO DRAINAGE AREAS NOT EXCEEDING ONE ACRE, AND NOT INTENDED TO CONTROL LARGE, CONCENTRATED STORMWATER FLOWS.

3.30 - TOPSOILING (TEMPORARY STOCKPILE): TOPSOIL SHALL BE STRIPPED FROM AREAS TO BE GRADED AND STOCKPILED FOR LATER SPREADING. STOCKPILE LOCATIONS SHALL BE LOCATED ONSITE AND SHALL BE STABILIZED WITH TEMPORARY SILT FENCE AND VEGETATION.

3.31 TEMPORARY SEEDING: ESTABLISHMENT OF TEMPORARY VEGETATIVE COVER ON DISTURBED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR PERIODS OF 30 DAYS TO ONE YEAR BY SEEDING WITH APPROPRIATE RAPIDLY-GROWING PLANTS.

3.32 PERMANENT SEEDING: ESTABLISHMENT OF PERENNIAL VEGETATIVE COVER BY PLANTING SEED ON ROUGH-GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR A YEAR OR MORE OR WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS NEEDED ON FINE-GRADED AREAS.

3.36 SOIL STABILIZATION BLANKETS & MATTING: PROTECTIVE COVERING (BLANKET) OR A SOIL STABILIZATION MAT ON A PREPARED PLANTING AREA OF A STEEP SLOPE, CHANNEL OR SHORELINE.

3.38 TREE PRESERVATION AND PROTECTION: PROTECTING EXISTING TREES FROM MECHANICAL AND OTHER INJURY DURING LAND-DISTURBING AND CONSTRUCTION ACTIVITY TO ENSURE THE SURVIVAL OF DESIRABLE TREES WHERE THEY WILL BE EFFECTIVE FOR EROSION AND SEDIMENT CONTROL AND PROVIDE OTHER ENVIRONMENTAL AND AESTHETIC BENEFITS.

PERMANENT STABILIZATION:

ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING. SEEDING SHALL BE DONE WITH REBEL TALL FESCUE ACCORDING TO SPEC. 3.32 PERMANENT SEEDING. OF THE VESCH. EROSION CONTROL BLANKETS WILL BE INSTALLED OVER FILL SLOPES, WHICH BEEN BROUGHT TO FINAL GRADE AND HAVE BEEN SEEDDED TO PROTECT THE SLOPES FROM EROSION AND TO ALLOW SEED TO GERMINATE PROPERLY. MULCH (STRAW OR FIBER) WILL BE USED ON RELATIVELY FLAT AREAS. IN ALL SEEDING OPERATIONS, SEED, FERTILIZER AND LIME WILL BE APPLIED PRIOR TO MULCHING.

STORMWATER RUNOFF CONSIDERATIONS:

THE PROPOSED PROJECT WILL INCREASE THE IMPERVIOUS AREA AS SHOWN ON SHEET C7.1. A BIORETENTION LEVEL 2 DRAINAGE CHANNEL WILL BE USED TO TREAT THIS INCREASE. INLET PROTECTION WILL BE USED TO CONTROL RUNOFF DURING CONSTRUCTION ACTIVITIES.

CALCULATIONS:  
REFER TO SHEET C7.0 ND C7.1 FOR PRE-DEVELOPMENT VERSUS POST-DEVELOPMENT PEAK RUNOFF CALCULATIONS.

MAINTENANCE:

THE SITE SUPERINTENDENT, OF HIS/HER REPRESENTATIVE, SHALL MAKE A VISUAL INSPECTION OF ALL MECHANICAL CONTROL AND NEWLY STABILIZED AREAS (I.E. SEEDDED AND MULCHED AND/OR SODDED AREA) ON A DAILY BASIS, ESPECIALLY AFTER A HEAVY RAINFALL EVENT TO INSURE THAT ALL CONTROLS ARE MAINTAINED AND PROPERLY FUNCTIONING ANY DAMAGED CONTROLS SHALL BE REPAIRED PRIOR TO THE END OF THE DAY INCLUDING RE-SEEDING AND MULCHING OR RESODDING IS NECESSARY. SILT FENCE SHALL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER. THE SEEDDED AREAS WILL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED AND RESEED AS NEEDED.

NO UNPROTECTED, DISTURBED AREA SHALL DRAIN TO ROADWAY PAVEMENTS SUCH THAT THE SUBBASE, BASE OR WEARING SURFACE ARE CONTAMINATED BY SILT TRAPPED AT LOW POINTS OR INLETS.

LAND CONSERVATION NOTES:

- MEASURES TO CONTROL EROSION AND SILTATION SHALL BE PROVIDED PURSUANT TO AND IN COMPLIANCE WITH CURRENT FEDERAL, STATE AND LOCAL REGULATIONS. THE INFORMATION CONTAINED IN THE CONSTRUCTION PLANS AND/OR THE APPROVAL OF THE PLANS SHALL IN NO WAY RELIEVE THE CONTRACTOR OR THEIR AGENT OF ANY LEGAL RESPONSIBILITY WHICH MAY BE REQUIRED BY THE CODE OF VIRGINIA OR ANY ORDINANCE ENACTED BY THE COUNTY OF FAIRFAX.
- ALL AREAS, ON OR OFF-SITE, WHICH ARE DISTURBED BY THIS CONSTRUCTION AND WHICH ARE NOT PAVED OR BUILT UPON SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION. ACCEPTABLE STABILIZATION SHALL CONSIST OF PERMANENT GRASS SEED MIXTURE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. ALL SLOPES 2:1 AND GREATER SHALL BE SODDED AND STAKED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE OWNER'S REPRESENTATIVE.
- PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDEED AREAS WITH SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDEED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DOMINANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
- DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON-SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
- A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDEED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT, IN THE OPINION OF THE LOCAL PROGRAM ADMINISTRATOR OF THEIR DESIGNATED AGENT, IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.
- SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
- STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
- SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE SEDIMENT BASIN SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE THE ANTICIPATED SEDIMENT LOADING FROM THE LAND-DISTURBING ACTIVITY. THE OUTFALL DEVICE OR SYSTEM DESIGN SHALL TAKE INTO ACCOUNT THE TOTAL DRAINAGE AREA FLOWING THROUGH THE DISTURBED AREA TO BE SERVED BY THE BASIN.
- CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.
- CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OF FILL SLOPES UNLESS CONTAINED WITH AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
- ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.
- BEFORE NEWLY CONSTRUCTED STORM WATER CONVEYANCE CHANNELS ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.
- WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.
- WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.
- ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE ADHERED TO.
- THE DEB AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN A WATERCOURSE IS COMPLETED.
- WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PUBLIC ROAD SURFACE, THE ROAD SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR WEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL SUBDIVISION LOTS AS WELL AS TO LARGER LAND DISTURBING ACTIVITIES.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM ADMINISTRATOR. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
- UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE REQUIREMENTS, STANDARDS AND SPECIFICATIONS:
  - NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
  - EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
  - EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
  - MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
  - RE-STABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS AND REQUIREMENTS.
  - APPLICABLE SAFETY REGULATIONS SHALL BE COMPLIED WITH.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ANY ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES NOT SHOWN HEREON THAT ARE DEEMED NECESSARY BY THE APPROVING AUTHORITY AND/OR THE SITE INSPECTOR.
- THE CONTRACTOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES DAILY. ANY DAMAGED CONTROLS SHALL BE REPAIRED OR REPLACED BY THE CLOSE OF EACH WORKING DAY.

GENERAL EROSION AND SEDIMENT CONTROL NOTES:

- ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS 4VAC50-30 EROSION AND SEDIMENT CONTROL REGULATIONS.
- ES-2: THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.
- ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.
- ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
- ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.
- ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE APPROVING AUTHORITY.
- ES-7: DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
- ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE. THIS SHALL BE DONE IN ACCORDANCE WITH FORT BELVOIR DIRECTORATE OF PUBLIC WORKS EROSION & SEDIMENT CONTROL TECHNICAL BULLETIN #1: DEWATERING OPERATIONS.
- ES-9: THE RESPONSIBLE LAND DISTURBER (RLD) SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

MINIMUM STANDARDS (PHASE I)

- MS-1: PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDEED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDEED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
- MS-2: DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS BORROW AREAS AND SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
- MS-3: A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDEED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.
- MS-4: SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
- MS-5: STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
- MS-6: SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.
  - THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.
  - SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25 YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.
- MS-7: CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.
- MS-8: CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITH AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.
- MS-9: WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
- MS-10: ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.
- MS-11: BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.
- MS-12: WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.
- MS-13: WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.
- MS-14: ALL APPLICABLE FEDERAL, STATE AND LOCAL CHAPTERS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.
- MS-15: THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.
- MS-16: UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
  - NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
  - EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
  - EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
  - MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND

- PROMOTE STABILIZATION.
- MS-17: APPLICABLE SAFETY CHAPTERS SHALL BE COMPLIED WITH, WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.
- MS-18: ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM VESCP AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
- MS-19: PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA. STREAM RESTORATION AND RELOCATION PROJECTS THAT INCORPORATE NATURAL CHANNEL DESIGN CONCEPTS ARE NOT MAN-MADE CHANNELS AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS:
  - CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.
  - ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:
    - THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS ONE HUNDRED TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR
    - NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A TWO-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.
      - ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO-YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND
      - PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.
    - IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:
      - IMPROVE THE CHANNELS TO A CONDITION WHERE A TEN-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO CHANNEL THE BED OR BANKS; OR
      - IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE TEN-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;
      - DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TEN-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR
      - PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE PLAN APPROVING VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.
    - THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.
    - ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.
    - IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE LOCALITY VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.
    - OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATORS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.
    - ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.
      - INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.
      - IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.
      - ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.
      - ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24-HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24-HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10-YEAR, 24-HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND

- VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS AS DEFINED IN ANY REGULATIONS FORMULATED PURSUANT TO § 10.1-562 OR 10.1-570 OF THE ACT.
- M. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 10.1-561 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 10.1-603.2 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND-DISTURBING ACTIVITIES ARE IN ACCORDANCE WITH 4VAC50-60-48 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMPP) PERMIT REGULATION. THIS PROVISION SHALL BE APPLIED TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.
- N. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 4VAC50-60-66 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMPP) PERMIT REGULATIONS SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF MINIMUM STANDARD 19.

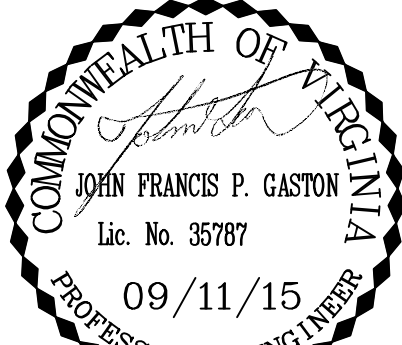
SEQUENCE OF CONSTRUCTION:

SEDIMENT CONTROL PLAN - PHASE 1:

- PERFORM PRE-CONSTRUCTION MEETING WITH THE RLD AND FT. BELVOIR DPW-ENRD EROSION & SEDIMENT CONTROL INSPECTOR TO REVIEW LIMITS OF DISTURBANCE, SEQUENCE OF CONSTRUCTION, AND EROSION & SEDIMENT CONTROL MEASURES.
- INSTALL CONSTRUCTION ENTRANCE, SUPER SILT FENCE AND TREE PROTECTION AS SHOWN ON SHEET C2.0.
- ONCE THE SITE INSPECTOR HAS APPROVED THE INSTALLATION OF THE PHASE 1 CONTROLS, BEGIN DEMOLITION OPERATION. CLEAR THE SITE OF VEGETATION AND EXISTING IMPROVEMENTS INDICATED FOR REMOVAL WITHIN THE LIMITS OF DISTURBANCE AS SHOWN ON SHEET C2.0. PROTECT AND MAINTAIN TREES INDICATED FOR PRESERVATION WITHIN OVERALL LIMITS OF DISTURBANCE.
- ONCE CLEARING AND DEMOLITION WORK HAS BEEN COMPLETED, BEGIN GRADING OPERATIONS, INSTALLATION OF UTILITIES AND CONSTRUCTION OF BASKETBALL COURT.
- UTILIZATION OF THE TEMPORARY STOCKPILE AND AND STAGING AREA TO BE USED AS NEEDED FOR CONSTRUCTION. THESE AREAS ARE TO BE PROTECTED WITH SILT FENCE AND TEMPORARY SEEDING.

SEDIMENT CONTROL PLAN - PHASE 2:

- EROSION AND SEDIMENT MEASURES INSTALLED WITH PHASE 1 WILL CONTINUE TO BE UTILIZED IN PHASE 2.
- CONSTRUCT PROPOSED CHANNEL AND INSTALL PERMANENT CHECK DAMS ONCE CHANNEL HAS BEEN EC-2 MATTED AND PERMANENTLY SEEDDED.
- CONTRACTOR SHALL MAINTAIN AND REPAIR AS NEEDED ANY EROSION AND SEDIMENT CONTROL MEASURES AT THE END OF EACH WORKING DAY.
- CONTINUE CONSTRUCTION ACTIVITIES. INSTALL UTILITIES (ELECTRICAL, WATER, STORM SEWER, ETC.) AND PERFORM FINAL GRADING. ALL NEW STORM INLETS WILL BE IMMEDIATELY PROTECTED WITH INLET PROTECTION UPON INSTALLATION.
- TEMPORARY VEGETATIVE STABILIZATION SHALL BE PROVIDED ON ALL DENUDEED AREAS THAT REMAIN UNIMPROVED FOR LONGER THAN 14 DAYS.
- BIO-RETENTION SHALL BE GRADED, INSTALLED, AND STABILIZED PER THE FINAL DESIGN ONCE ALL AREAS UPSTREAM HAVE BEEN STABILIZED. BIO-RETENTION SURFACE AREA TO BE PLANTED IN ACCORDANCE WITH THE LANDSCAPING PLAN ON SHEET L1.0.
- COMPLETE INSTALLATION OF ALL IMPROVEMENTS, FINAL GRADING, PERMANENT STABILIZATION AND LANDSCAPING OF AREAS THAT DO NOT INCLUDE CONCRETE AND/OR GRAVEL AREAS. EC-2 MATTING SHALL BE INSTALLED ON ALL SLOPES 3:1 OR GREATER AND PERMANENTLY SEEDDED. CONSTRUCTION ENTRANCE WILL BE REMOVED FOR THE INSTALLATION OF THE PROPOSED TRAIL.
- UPON APPROVAL FROM THE FT. BELVOIR DPW-ENRD EROSION & SEDIMENT CONTROL INSPECTOR - AFTER CONSTRUCTION OPERATIONS HAVE ENDED AND ALL DISTURBED AREAS HAVE BEEN STABILIZED, MECHANICAL SEDIMENT CONTROLS (SILT FENCE, INLET PROTECTION, ETC.) MAY BE REMOVED.



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---	---

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DATE 04/29/15 06/23/15 07/16/15 09/11/15	DATE 6/23/15
DRAWN BY KG	CHECKED BY JG
DESIGNED BY KG	SCALE SEE PLAN

<b>TIMMONS GROUP</b>	<b>NCE RECREATIONAL FACILITY</b> FT BELVOIR, VA	<b>EROSION &amp; SEDIMENT CONTROL NOTES &amp; DETAILS</b>
JOB NO. <b>36145</b>	SHEET NO. <b>C2.2</b>	

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1992

3.31

**Mulching**

1. Seedlings made in fall for winter cover and during hot and dry summer months shall be mulched according to MULCHING, Std. & Spec. 3.35, except that hydromulches (fiber mulch) will not be considered adequate. Straw mulch should be used during these periods.
2. Temporary seedlings made under favorable soil and site conditions during optimum spring and fall seeding dates may not require mulch.

**Re-seeding**

Areas which fail to establish vegetative cover adequate to prevent rill erosion will be re-seeded as soon as such areas are identified.

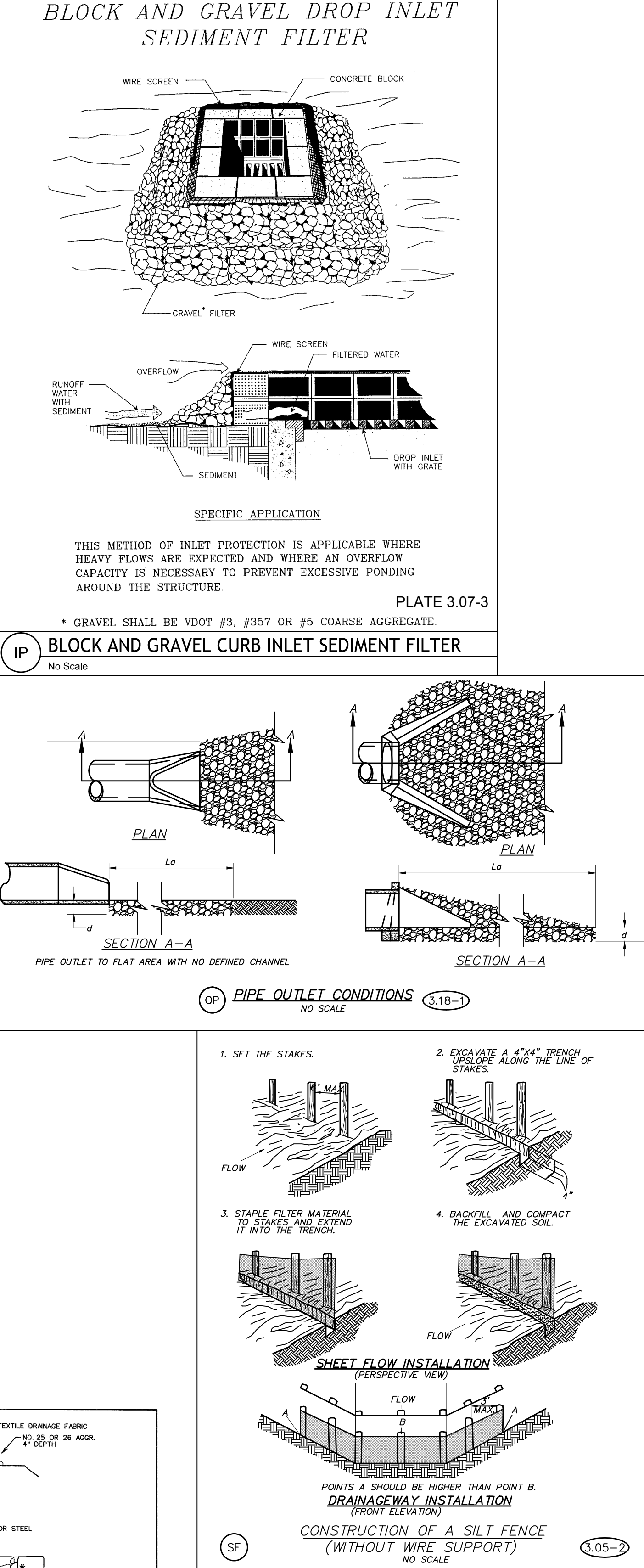
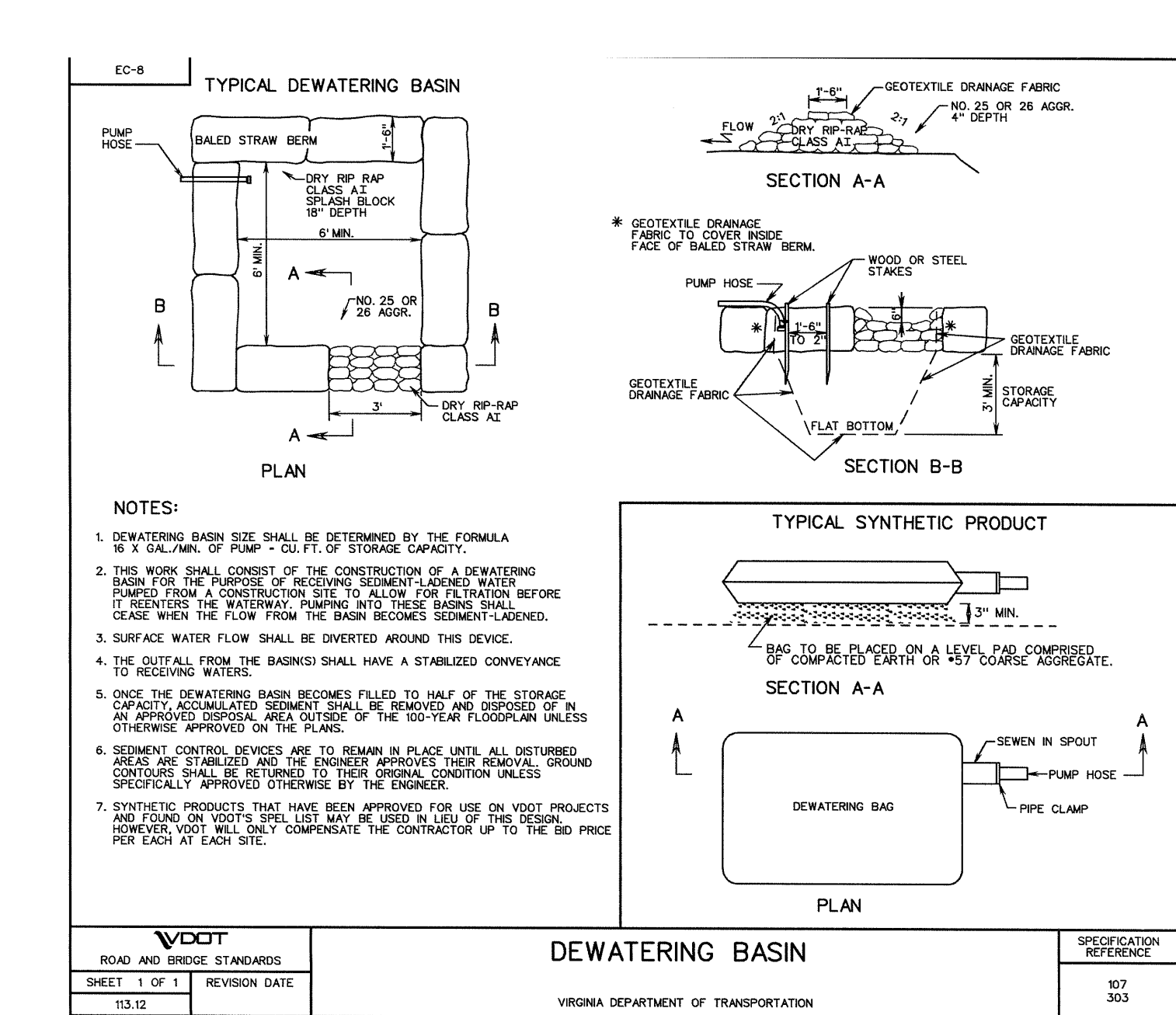
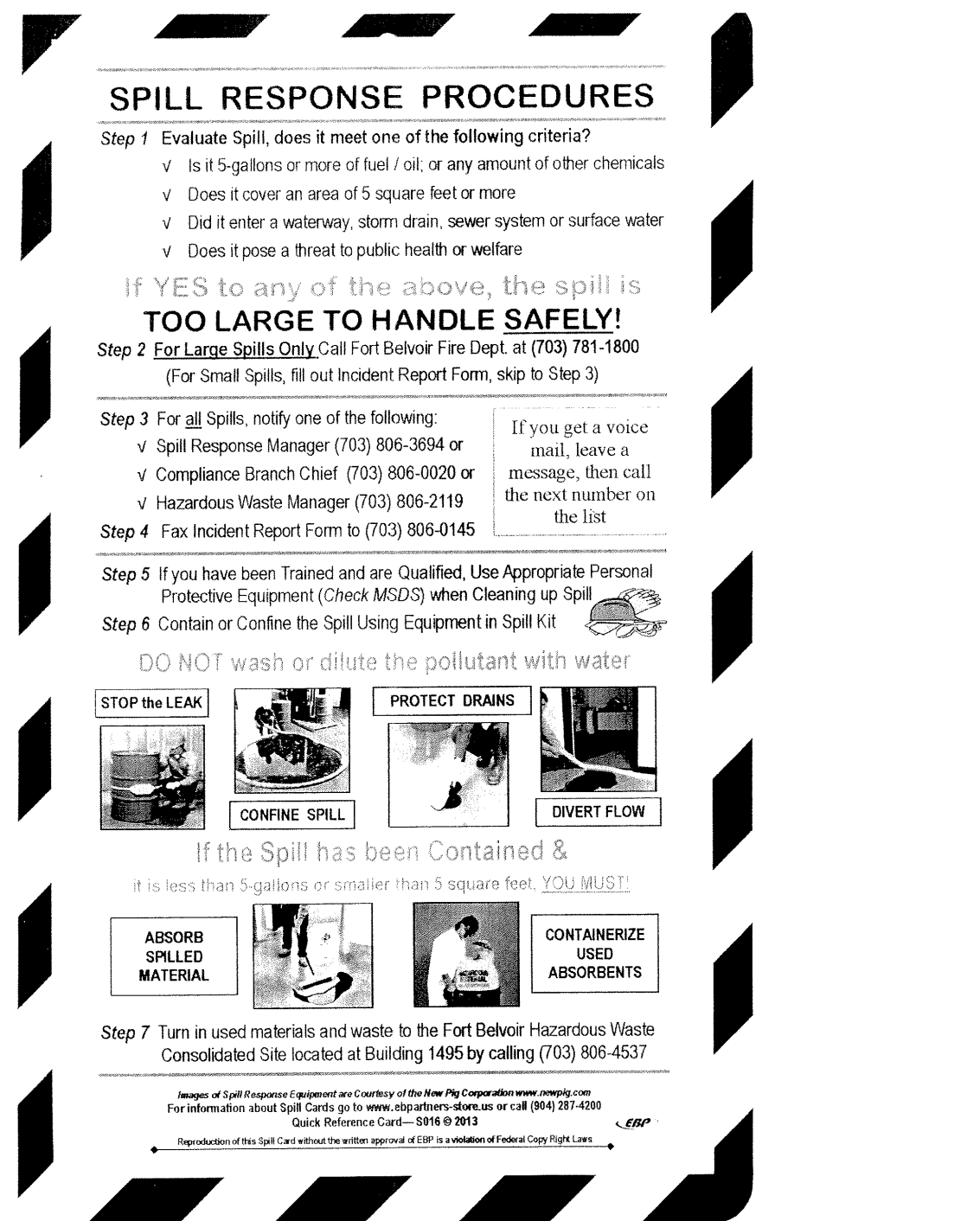
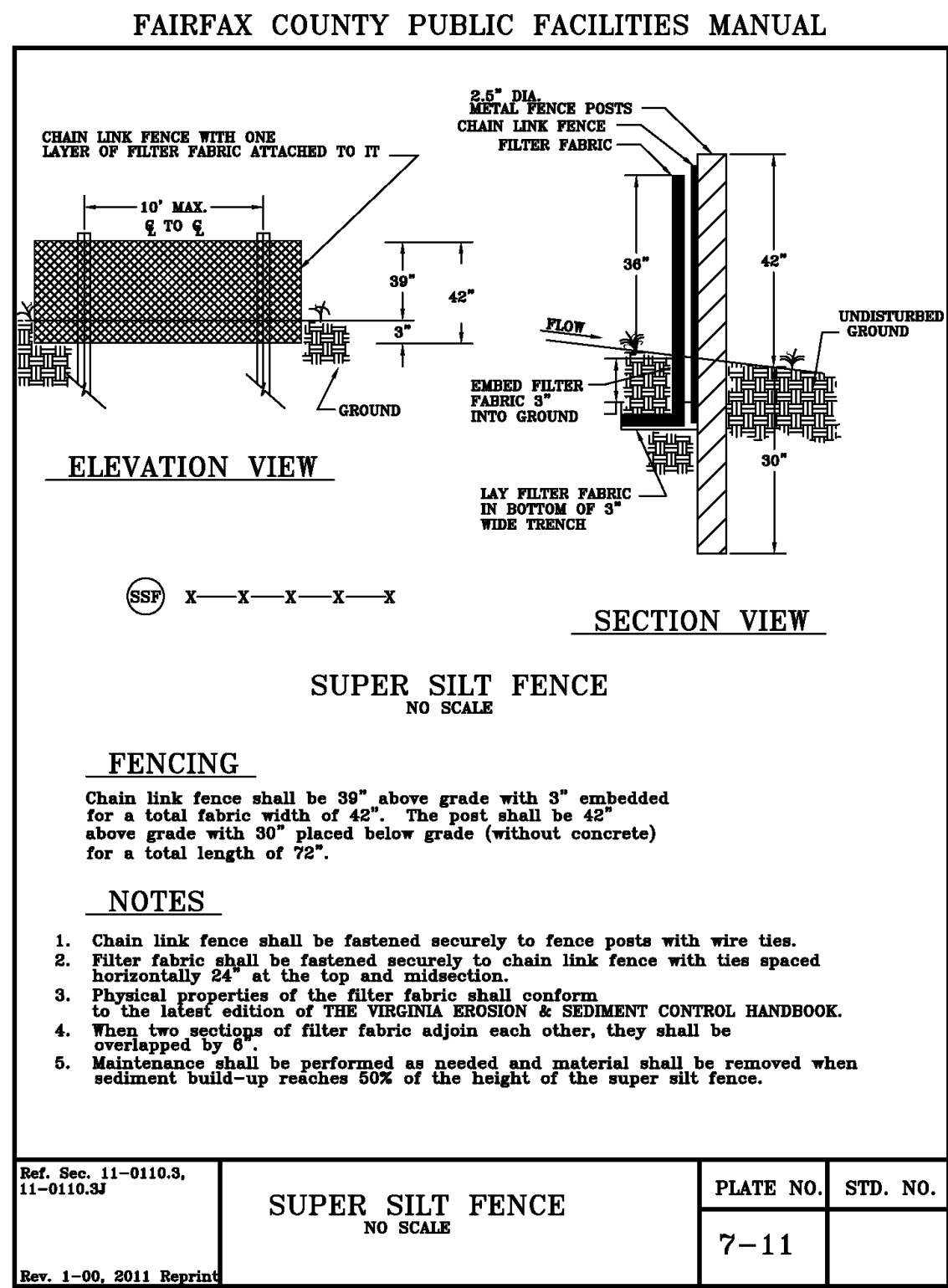
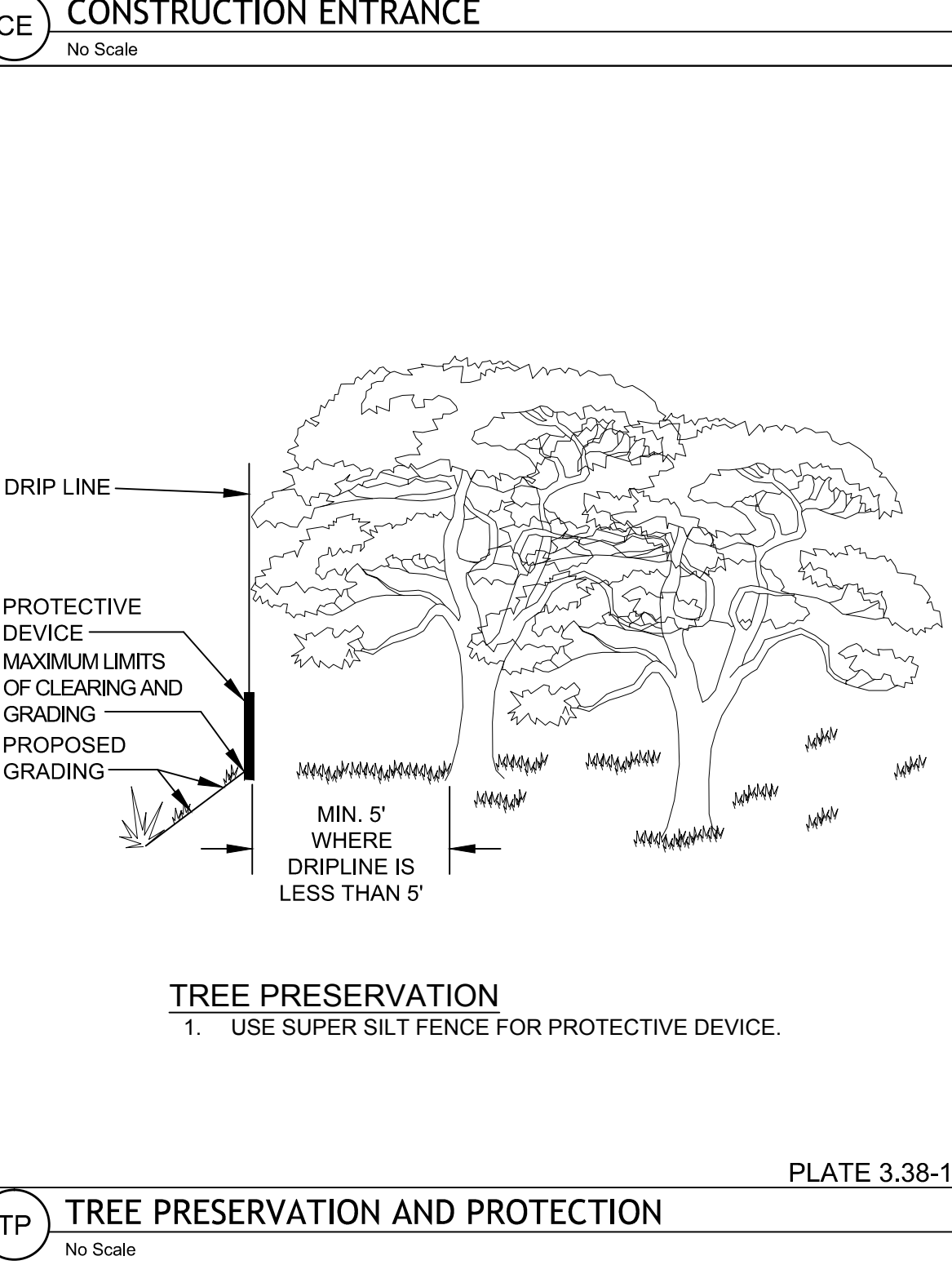
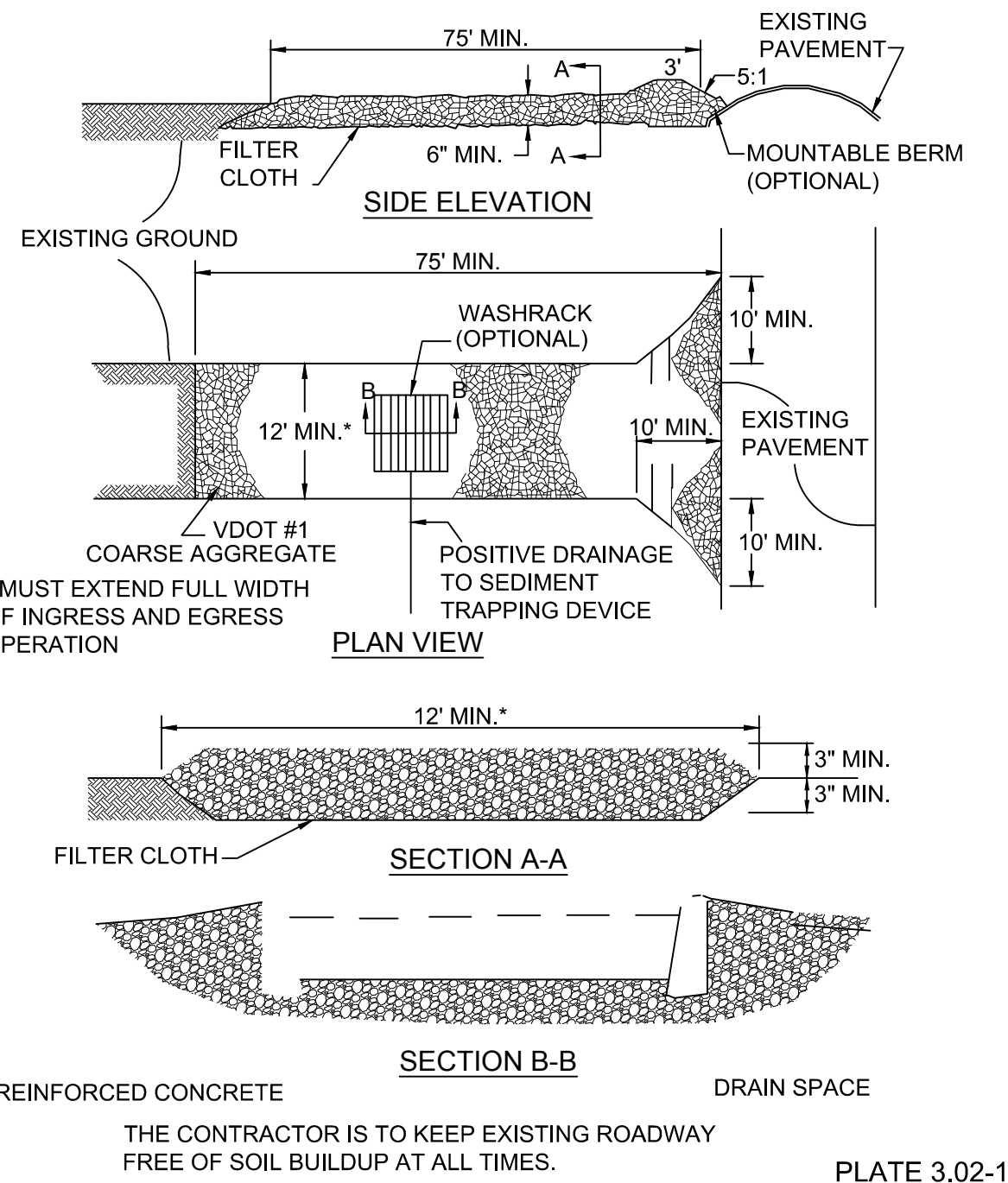
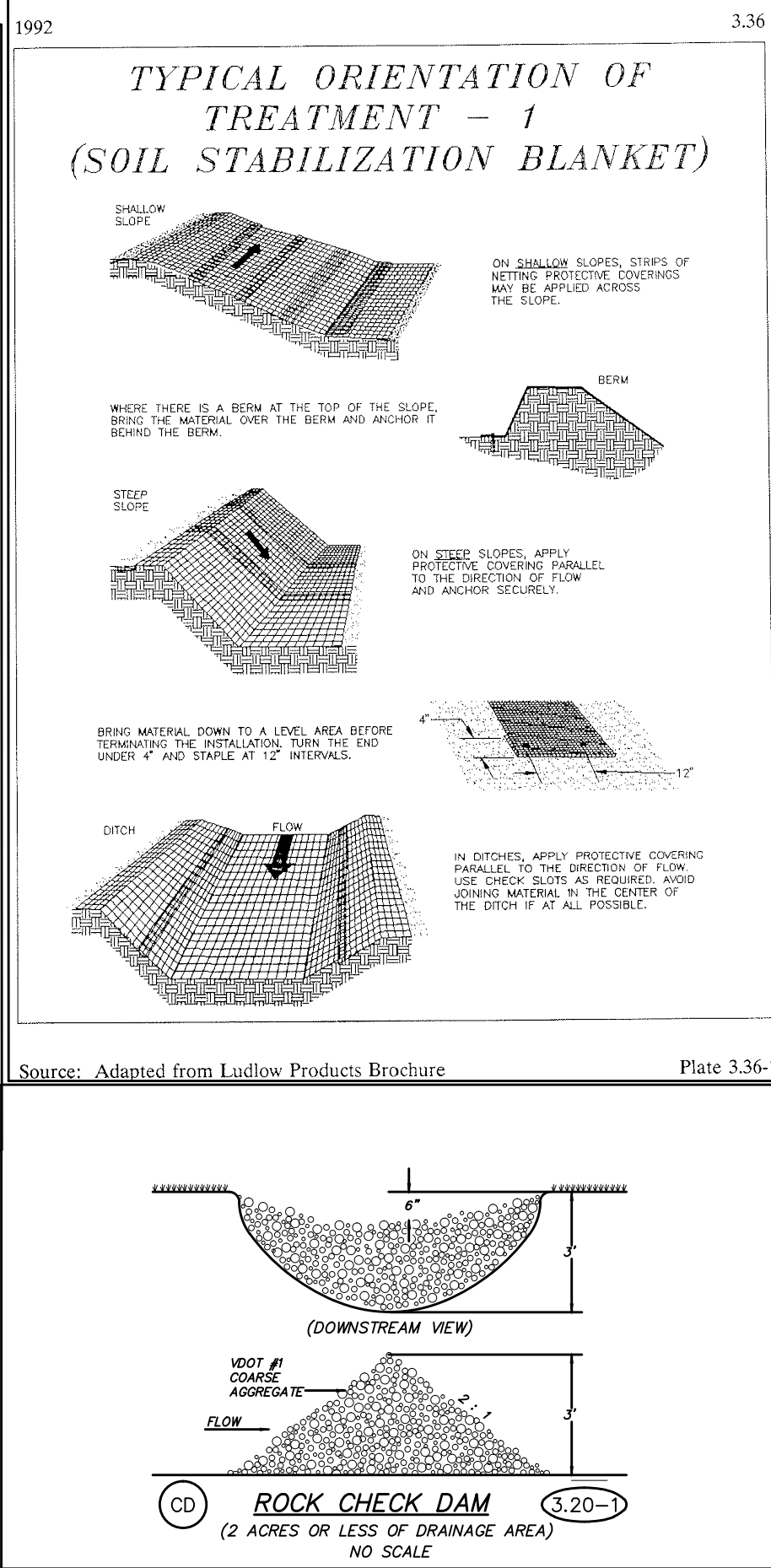
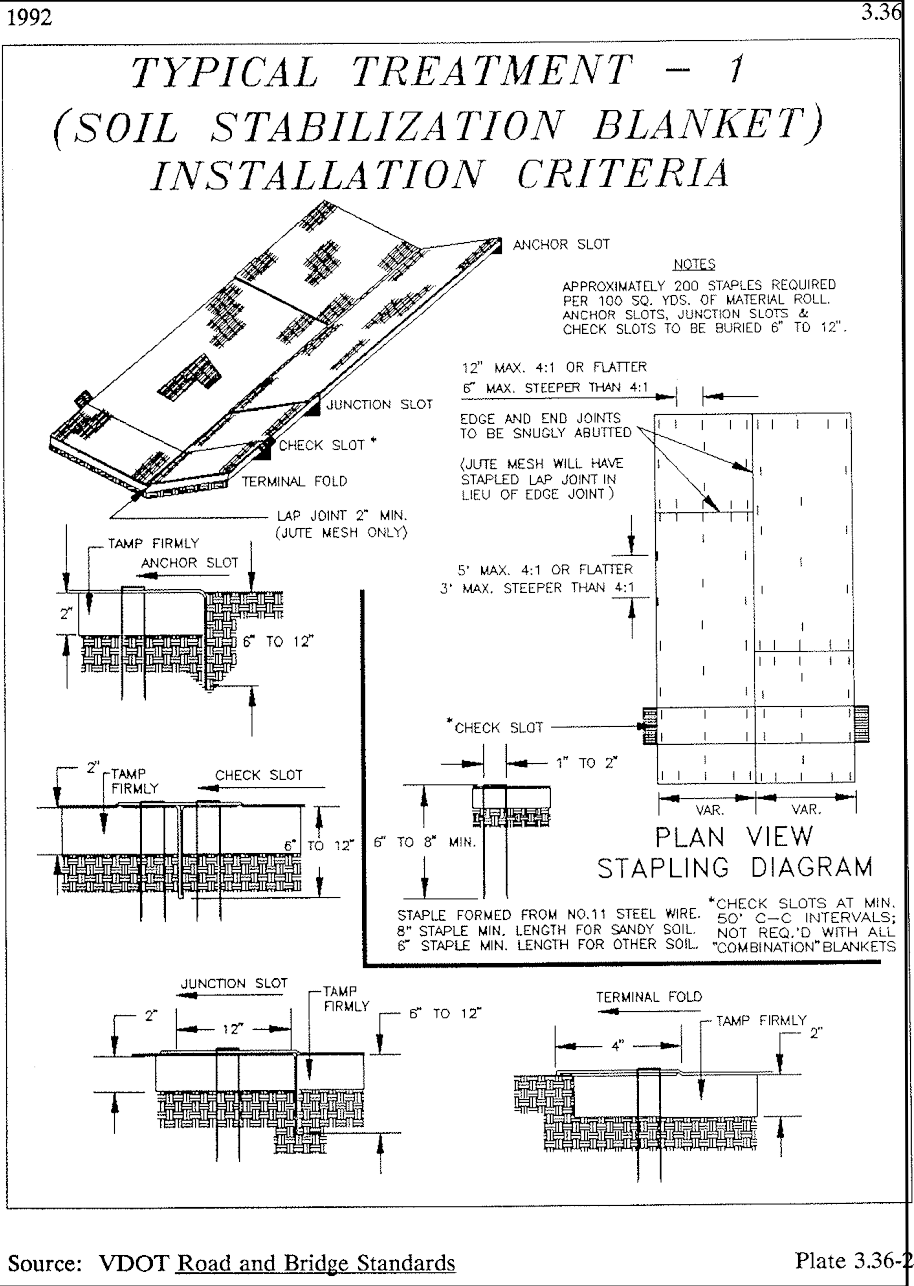
**TABLE 3.31-B**  
**ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS**  
**"QUICK REFERENCE FOR ALL REGIONS"**

Planting Dates	Species	Rate (lbs./acre)
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass ( <i>Lolium multi-florum</i> ) & Cereal (Winter) Rye ( <i>Secale cereale</i> )	50 - 100
Feb. 16 - Apr. 30	Annual Ryegrass ( <i>Lolium multi-florum</i> )	60 - 100
May 1 - Aug 31	German Millet ( <i>Setaria italica</i> )	50

Source: Va. DSWC

III - 287

1992	3.32								
<b>TABLE 3.32-D</b> <b>SITE SPECIFIC SEEDING MIXTURES FOR PIEDMONT AREA</b>									
<b>Minimum Care Lawn</b>	<b>Total Lbs. Per Acre</b>								
- Commercial or Residential	175-200 lbs.								
- Kentucky 31 or Turf-Type Tall Fescue	95-100%								
- Improved Perennial Ryegrass	0-5%								
- Kentucky Bluegrass	0-5%								
<b>High-Maintenance Lawn</b>	200-250 lbs.								
- Kentucky 31 or Turf-Type Tall Fescue	100%								
<b>General Slope (3:1 or less)</b>									
- Kentucky 31 Fescue	128 lbs.								
- Red Top Grass	2 lbs.								
- Seasonal Nurse Crop *	20 lbs.								
<b>Low-Maintenance Slope (Steeper than 3:1)</b>									
- Kentucky 31 Fescue	108 lbs.								
- Red Top Grass	2 lbs.								
- Seasonal Nurse Crop *	20 lbs.								
- Crownvetch **	150 lbs.								
<p>* Use seasonal nurse crop in accordance with seeding dates as stated below:</p> <table> <tr> <td>February 16th through April</td><td>Annual Rye</td></tr> <tr> <td>May 1st through August 15th</td><td>Foral Millet</td></tr> <tr> <td>August 16th through October</td><td>Annual Rye</td></tr> <tr> <td>November through February 15th</td><td>Winter Rye</td></tr> </table> <p>** Substitute <i>Secaria lespedeza</i> for Crownvetch east of Farmville, Va. (May through September use hulled <i>Secaria</i>, all other periods, use unhulled <i>Secaria</i>). If <i>Flatpea</i> is used in lieu of Crownvetch, increase rate to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in mixes.</p>		February 16th through April	Annual Rye	May 1st through August 15th	Foral Millet	August 16th through October	Annual Rye	November through February 15th	Winter Rye
February 16th through April	Annual Rye								
May 1st through August 15th	Foral Millet								
August 16th through October	Annual Rye								
November through February 15th	Winter Rye								
<p>*NOTE: REBEL TALL FESCUE TO BE USED FOR PERMANENT SEED MIXTURE.</p>									



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07/16/15	RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15
09/11/15	RESPONSE TO COMMENTS ON 100% SUBMISSION

DATE  
6/23/15

DRAWN BY  
KG

DESIGNED BY  
KG

CHECKED BY  
JG

SCALE  
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JOB NO.  
36145

SHEET NO.  
C2.3

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**NCE RECREATIONAL FACILITY**

**FT BELVOIR, VA**

**EROSION & SEDIMENT CONTROL NOTES & DETAILS**

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Washout Solutions water tight bins are delivered to ANY location on a jobsite. Once the bin is set in place, the concrete trucks can washout directly in the bin. When the bins are full, call for a pick up, and we do the rest. No water is left or dumped on site and we are responsible of disposing of the waste water and solid concrete material.

The solid concrete waste is weighed and can contribute to LEED® Materials and Resources credits on a project seeking LEED® certification. The water can be recovered, treated, and used for irrigation or other non potable uses.

- 5.5 cubic yards, which is the equivalent of 38 ready-mix trucks and 2 pump trucks or 350 cubic yards of poured concrete.



**CONTACT US FOR PRICING AND AVAILABILITY**  
**571-269-7295**  
[customerservice@vawashout.com](mailto:customerservice@vawashout.com)



NOTE: WASHOUT SOLUTIONS, LLC CONCRETE WASHOUT OR EQUAL AS APPROVED BY FORT BELVOIR DIRECTORATE OF PUBLIC WORKS.

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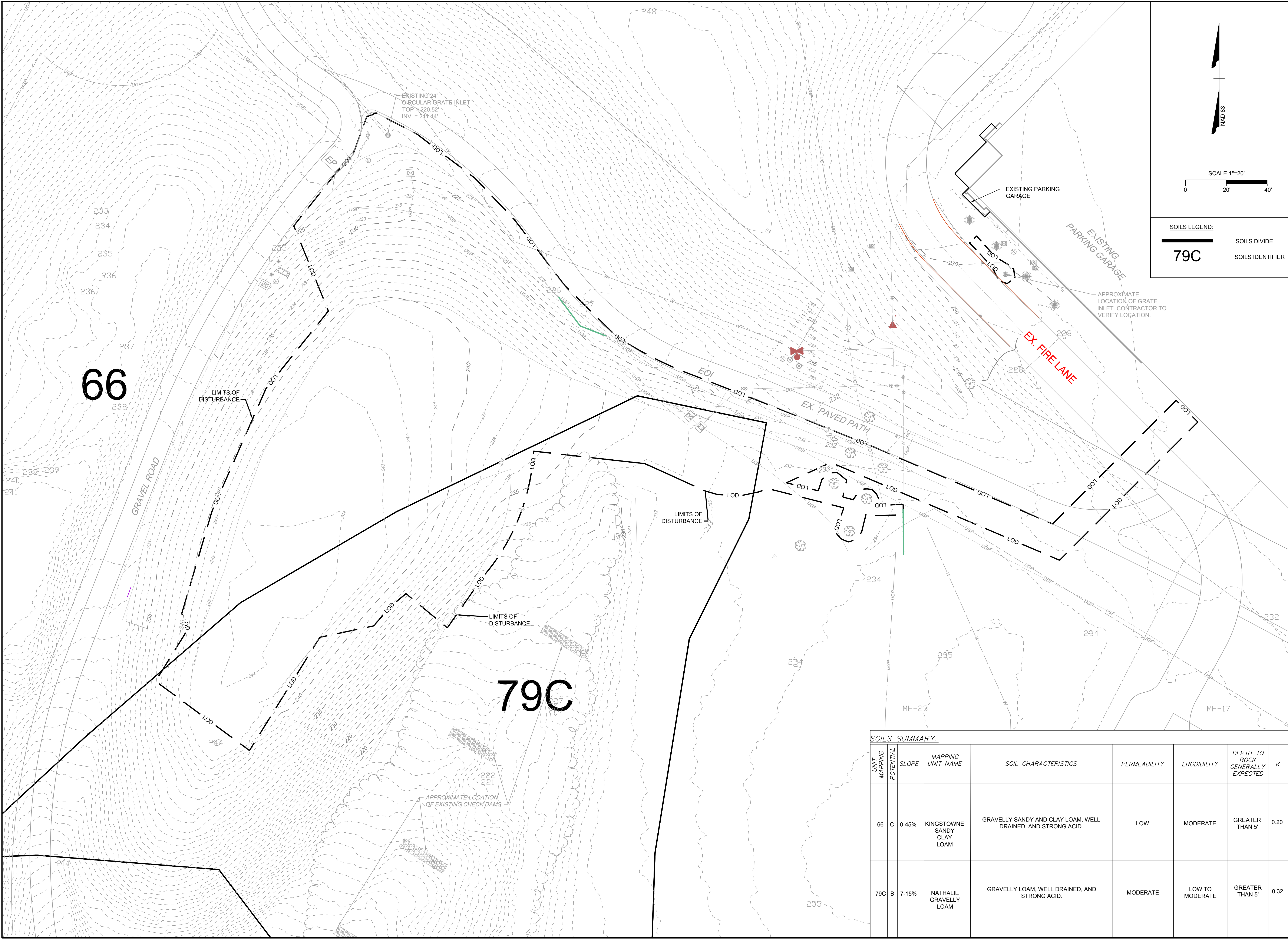
Concrete washout facilities, such as washout pits and vinyl or metal washout containers, should be placed in locations that provide convenient access to concrete trucks, preferably near the area where concrete is being poured. However they

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09/11/15

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FT BELVOIR, VA

SOILS IDENTIFICATION MAP

JOB NO.  
36145

SHEET NO.  
C2.5

REVISION DESCRIPTION

35% SUBMISSION

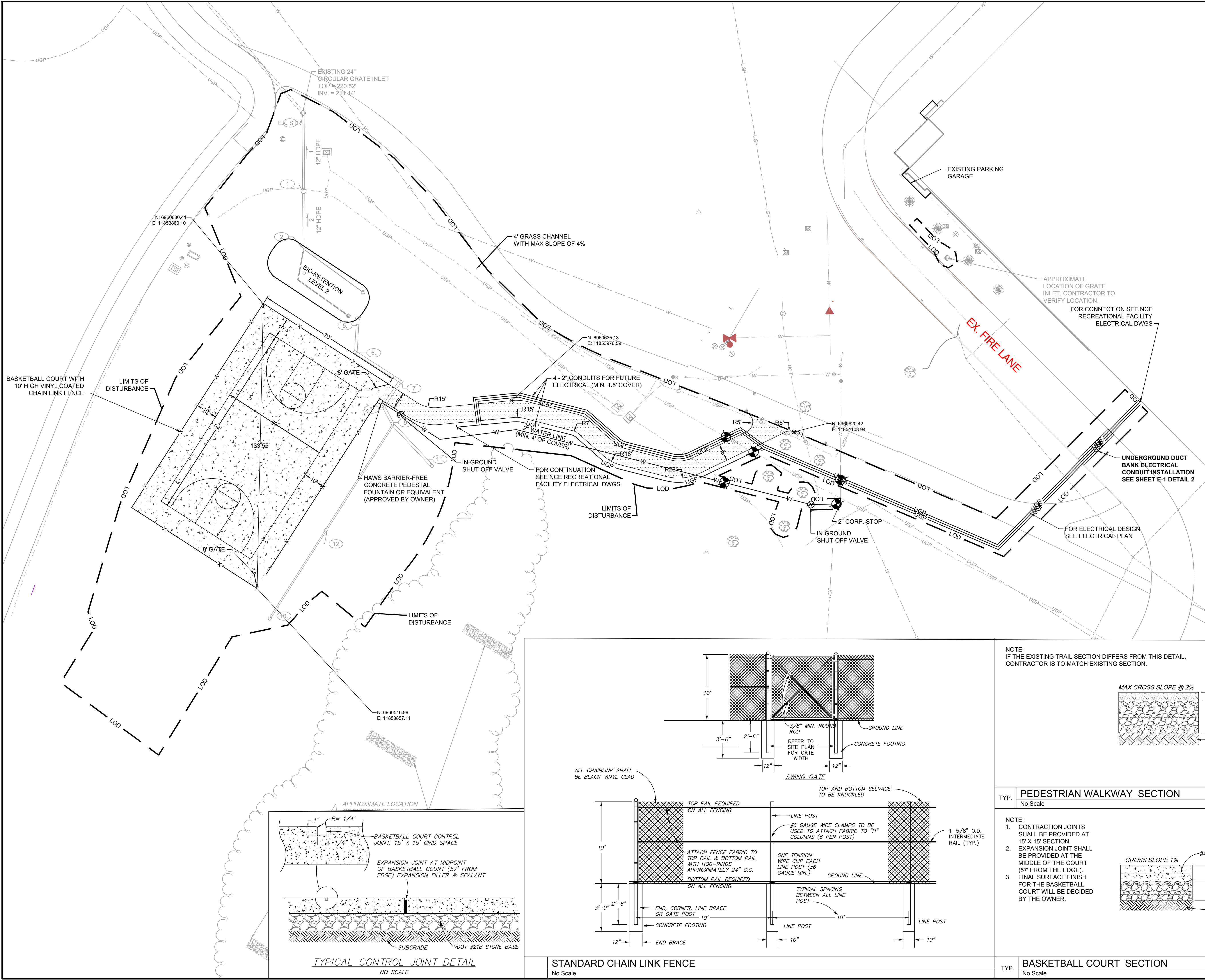
RESPONSE TO COMMENTS/ 95% SUBMISSION

RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15

RESPONSE TO COMMENTS ON 100% SUBMISSION

SOILS SUMMARY:									
UNIT	MAPPING	POTENTIAL	SLOPE	MAPPING UNIT NAME	SOIL CHARACTERISTICS	PERMEABILITY	ERODIBILITY	DEPTH TO ROCK GENERALLY EXPECTED	K
66	C	0-45%	KINGSTOWNE SANDY CLAY LOAM	GRAVELLY SANDY AND CLAY LOAM, WELL DRAINED, AND STRONG ACID.	LOW	MODERATE	GREATER THAN 5'	0.20	
79C	B	7-15%	NATHALIE GRAVELLY LOAM	GRAVELLY LOAM, WELL DRAINED, AND STRONG ACID.	MODERATE	LOW TO MODERATE	GREATER THAN 5'	0.32	





SCALE 1"=20'

0 20' 40'

**HATCH LEGEND:**

- PEDESTRIAN WALKWAY
- BASKETBALL COURT
- LOD LIMIT OF DISTURBANCE

**NOTES:**

- ELECTRICAL PULL BOX TO BE INSTALLED EVERY 200'.
- ELECTRICAL CONDUIT COVER SHALL HAVE A MINIMUM COVER OF 1.5'
- 2" WATER LINE TO BE INSTALLED WITH A MINIMUM OF 4" OF COVER.
- INFORMATION CONCERNING UNDERGROUND UTILITIES WAS OBTAINED FROM AVAILABLE RECORDS. THE CONTRACTOR MUST DETERMINE THE EXACT LOCATIONS AND ELEVATIONS OF THE UTILITIES BY DIGGING TEST PITS BY HAND AT ALL UTILITY CROSSINGS WELL IN ADVANCE OF TRENCHING. IF CLEARANCE ARE LESS THAN 12 INCHES WHEN NOT SPECIFIED CONTACT THE ENGINEER AND THE OWNER OF THE OTHER INVOLVED UTILITY BEFORE PROCEEDING WITH CONSTRUCTION.

**UTILITY LEGEND:**

- W PROPOSED W/L
- W EXISTING W/L
- UGP PROPOSED U/G POWER
- UGP EXISTING U/G POWER
- UGT EXISTING U/G TELECOMM
- WATER VALVE
- TEST PIT LOCATION

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RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15	07/16/15
RESPONSE TO COMMENTS ON 100% SUBMISSION	09/11/15

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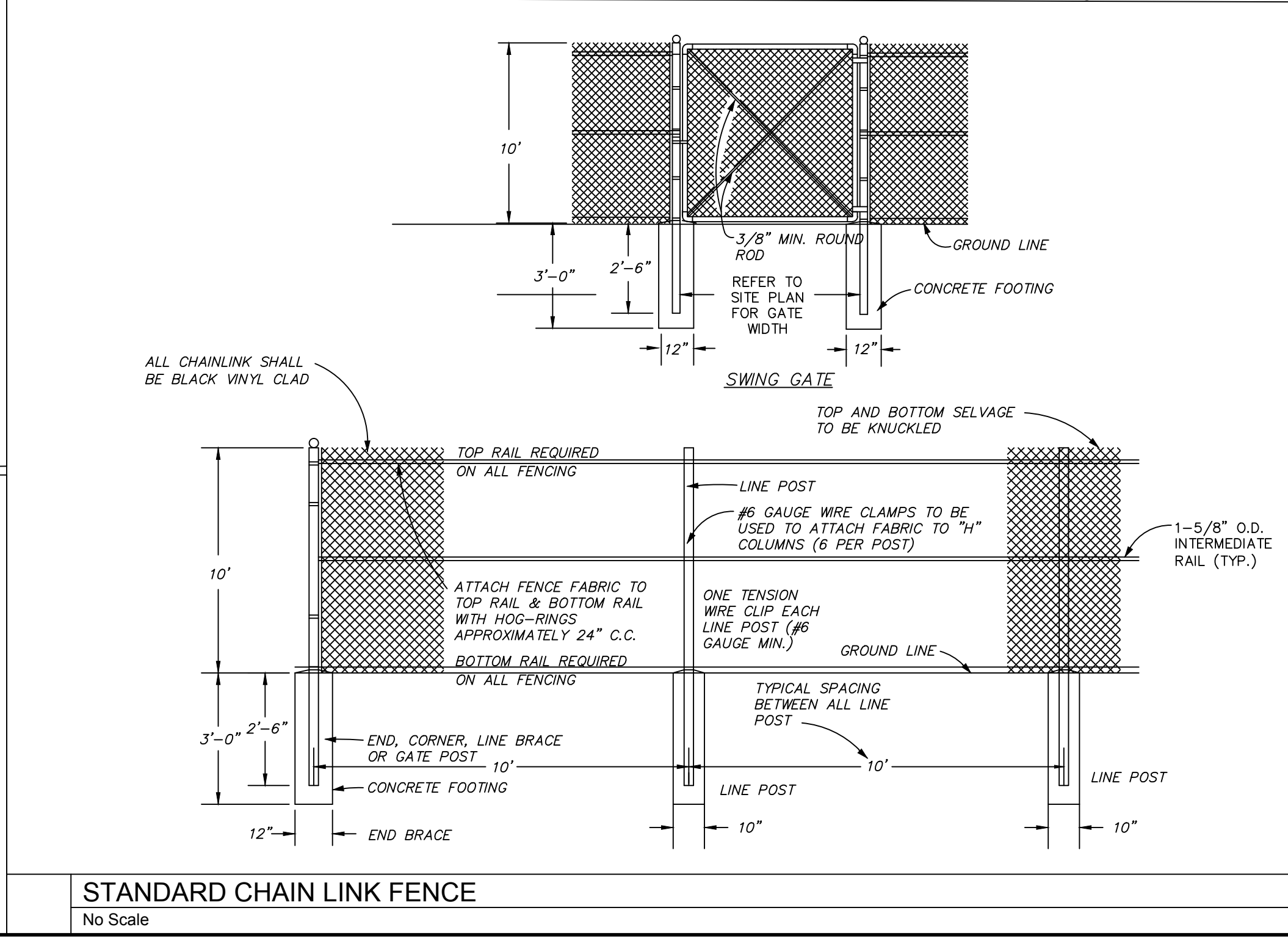
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LAYOUT AND UTILITY PLAN

JOB NO.  
**36145**

SHEET NO.  
**C3.0**

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**NOTE:**  
IF THE EXISTING TRAIL SECTION DIFFERS FROM THIS DETAIL, CONTRACTOR IS TO MATCH EXISTING SECTION.

**PEDESTRIAN WALKWAY SECTION**

TYP. No Scale

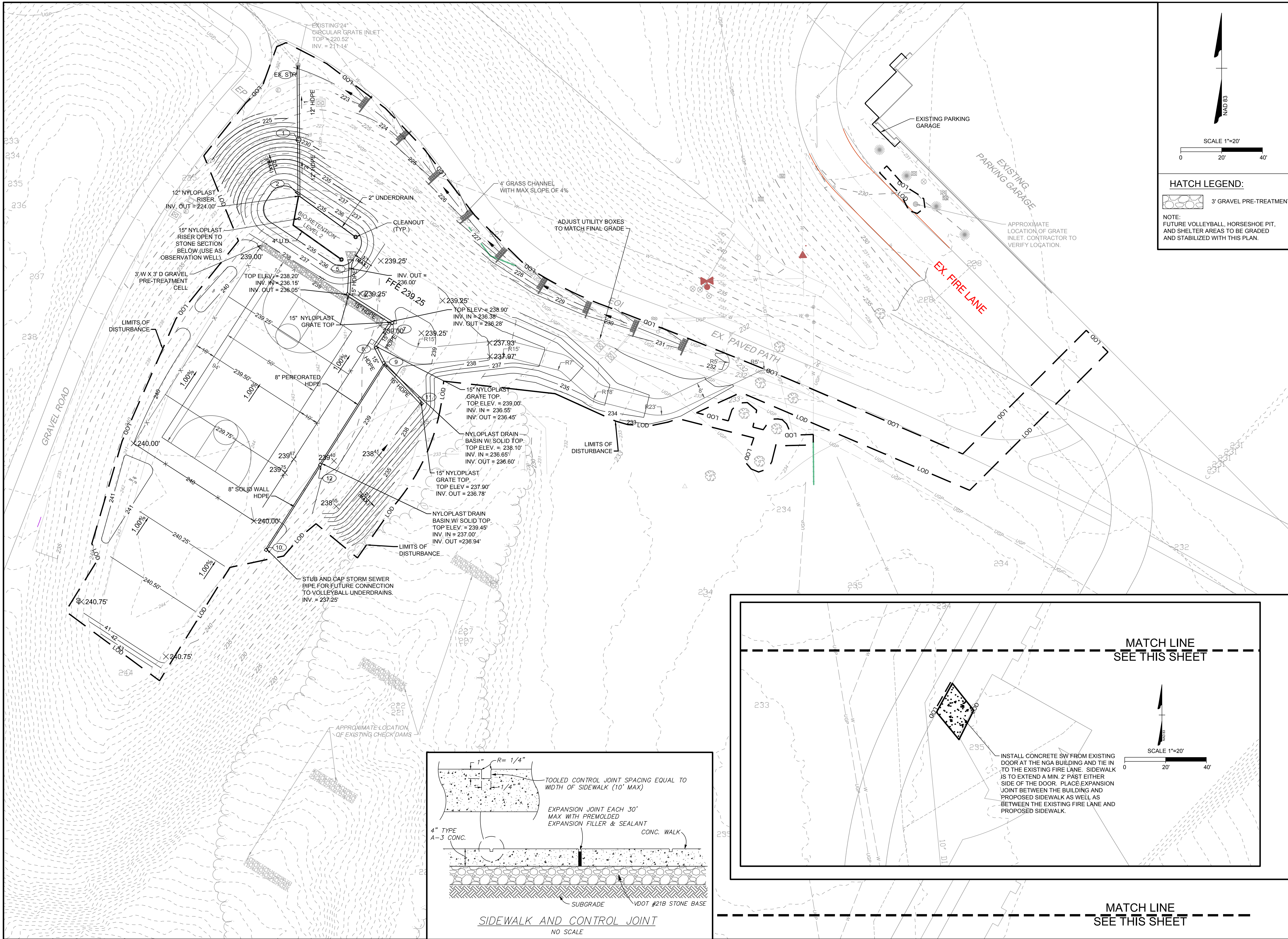
**NOTE:**

- CONTRACTION JOINTS SHALL BE PROVIDED AT 15' X 15' SECTION.
- EXPANSION JOINT SHALL BE PROVIDED AT THE MIDDLE OF THE COURT (57' FROM THE EDGE).
- FINAL SURFACE FINISH FOR THE BASKETBALL COURT WILL BE DECIDED BY THE OWNER.

**BASKETBALL COURT SECTION**

TYP. No Scale





SCALE 1"=20'

0 20' 40'

**HATCH LEGEND:**

3" GRAVEL PRE-TREATMENT

NOTE:  
FUTURE VOLLEYBALL, HORSESHOE PIT,  
AND SHELTER AREAS TO BE GRADED  
AND STABILIZED WITH THIS PLAN.

09/11/15

PROFESSIONAL ENGINEER

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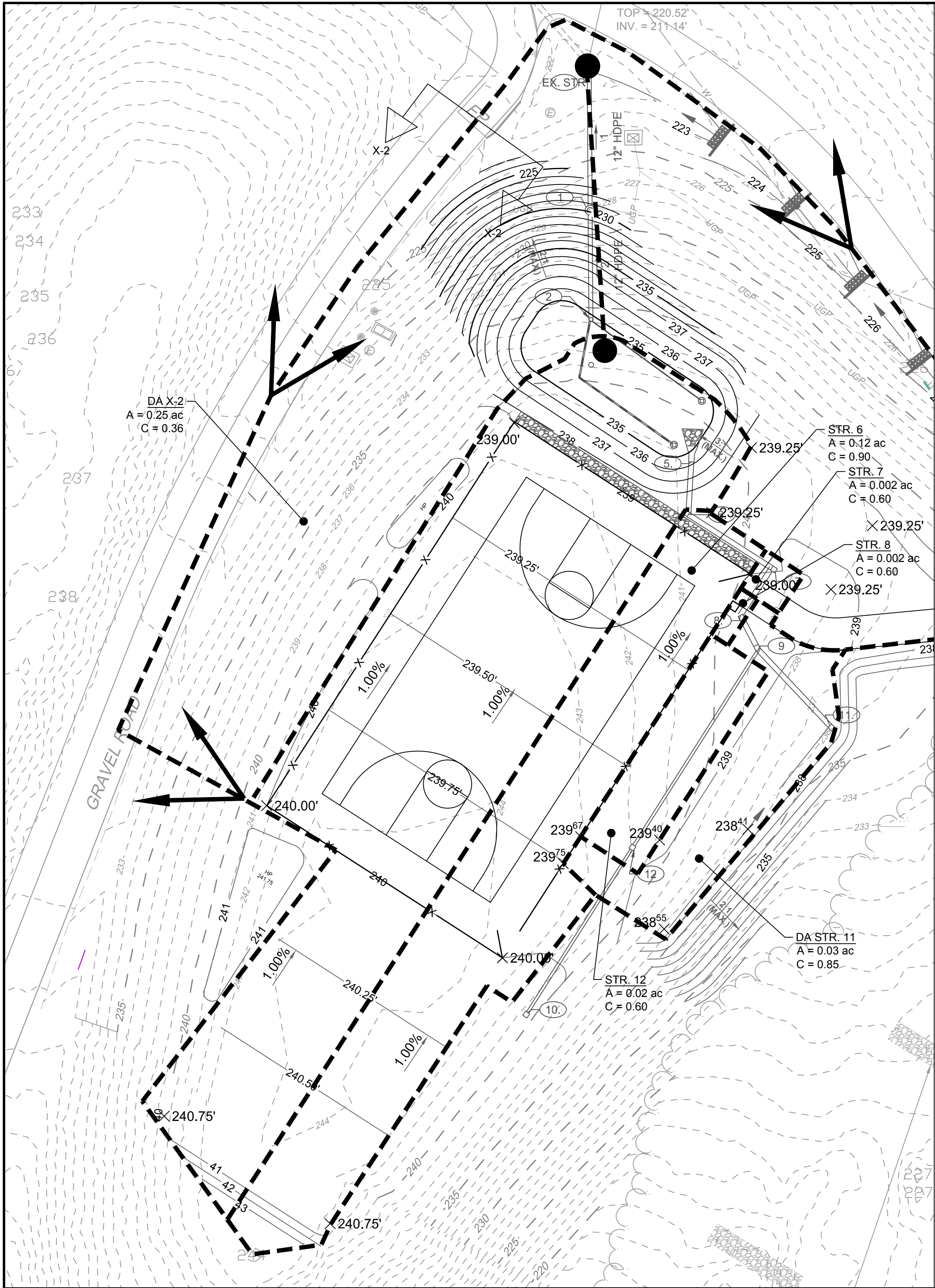
**GRADING AND DRAINAGE PLAN**

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Worksheet for DITCH X-2 (2 YEAR)			
Project Description			
Friction Method	Manning Formula		
Solve For	Normal Depth		
Input Data			
Channel Slope	0.04500	ft/ft	
Discharge	0.46	ft <sup>3</sup> /s	
Section Definitions			

Station (ft)	Elevation (ft)	
0+08	223.00	
0+12	222.10	
0+13	222.06	
0+18	222.88	

Roughness Segment Definitions		
Start Station	Ending Station	Roughness Coefficient
(0+08, 223.00)	(0+18, 222.88)	0.035

Options	
Current roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.16	ft
Elevation Range	222.06 to 223.00	ft
Flow Area	0.24	ft <sup>2</sup>
Wetted Perimeter	2.45	ft
Hydraulic Radius	0.10	ft
Top Width	2.42	ft
Normal Depth	0.16	ft
Critical Depth	0.16	ft
Critical Slope	0.03875	ft/ft

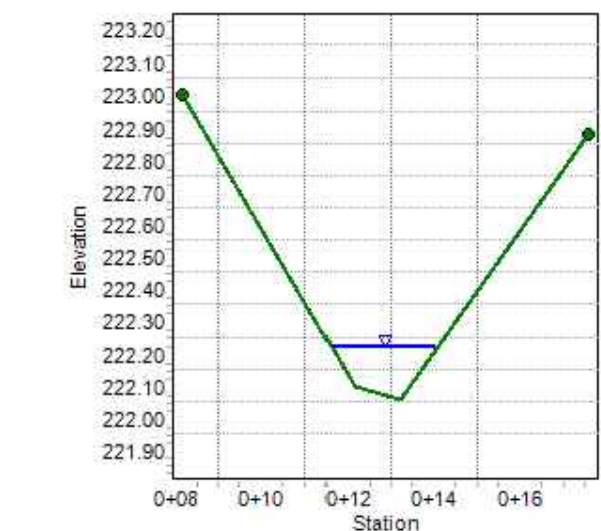
Worksheet for DITCH X-2 (2 YEAR)		
Results		
Velocity	1.91	ft/s
Velocity Head	0.06	ft
Specific Energy	0.21	ft
Froude Number	1.07	
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.16	ft
Critical Depth	0.16	ft
Channel Slope	0.04500	ft/ft
Critical Slope	0.03875	ft/ft

Cross Section for DITCH X-2 (2 YEAR)	
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Cross Section Image		



Worksheet for DITCH X-2 (10 YEAR)			
Project Description			
Friction Method	Manning Formula		
Solve For	Normal Depth		
Input Data			
Channel Slope	0.04500	ft/ft	
Discharge	0.62	ft³/s	
Section Definitions			

Station (ft)	Elevation (ft)	
0+08	223.00	
0+12	222.10	
0+13	222.06	
0+18	222.88	

Roughness Segment Definitions		
Start Station	Ending Station	Roughness Coefficient
(0+08, 223.00)	(0+18, 222.88)	0.035

Options	
Current roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results		
Normal Depth	0.18	ft
Elevation Range	222.06 to 223.00	ft
Flow Area	0.30	ft <sup>2</sup>
Wetted Perimeter	2.67	ft
Hydraulic Radius	0.11	ft
Top Width	2.64	ft
Normal Depth	0.18	ft
Critical Depth	0.19	ft
Critical Slope	0.03710	ft/ft

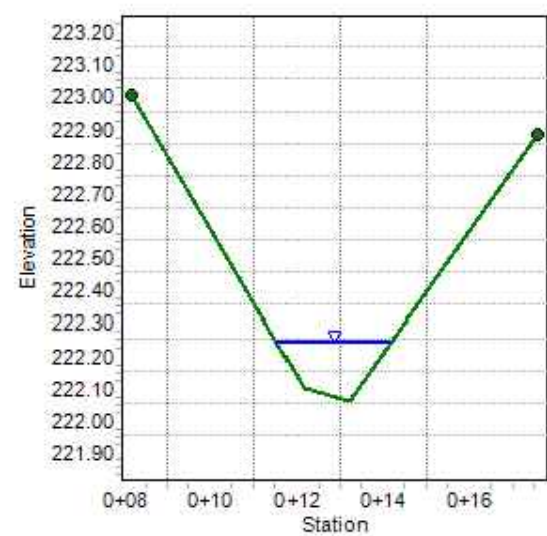
Worksheet for DITCH X-2 (10 YEAR)		
Results		
Velocity	2.09	ft/s
Velocity Head	0.07	ft
Specific Energy	0.25	ft
Froude Number	1.10	
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

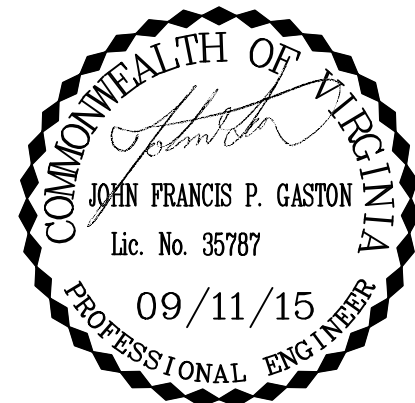
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.18	ft
Critical Depth	0.19	ft
Channel Slope	0.04500	ft/ft
Critical Slope	0.03710	ft/ft

Cross Section for DITCH X-2 (10 YEAR)	
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Cross Section Image		



- NOTES:
1. RAINFALL INTENSITY VALUES BASED OFF OF NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY. THE 1 EAR, 2 YEAR, AND 10 YEAR INTENSITY VALUES ARE 4.30, 5.15, AND 6.84 INCHES PER HOUR.
  2. ALL INLET WEIGHTED DRAINAGE AREA COEFFICIENTS ACCOUNT FOR FUTURE DEVELOPED LAND USE.



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06/23/15  
07/16/15  
09/11/15

REVISION DESCRIPTION  
35% SUBMISSION  
RESPONSE TO COMMENTS/95% SUBMISSION  
RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15  
RESPONSE TO COMMENTS ON 100% SUBMISSION

DATE  
6/23/15

DRAWN BY  
KG

DESIGNED BY  
KG

CHECKED BY  
JG

SCALE  
SEE PLAN

**TIMMONS GROUP**

NCE RECREATIONAL FACILITY  
FT BELVOIR, VA

STORM PROFILES AND CALCULATIONS

JOB NO.  
36145

SHEET NO.  
C4.1

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STORM FREQUENCY  Year

Checked by: JG

UNITS	ENGLISH
-------	---------

PIPE NO	FROM POINT		TO POINT		DRAIN AREA "A" Acre	RUNOFF COEFF "C"	CA			TOTAL INLET TIME Minutes	RAIN FALL In/Hr	RUNOFF Q CFS	INVERT ELEVATIONS		LENGTH OF Pipe Ft. (12)	SLOPE Ft./In. (13)	SIZE (Dia Or Spun/Rise) In. (14)	SHAPE	Capacity CFS (15)	Friction Slope Ft./Ft. (16)	VEL Vn Ft/Sec (17)	FLOW TIME Sec. (18)	REMARKS
	REFERENCE	STA.	REFERENCE	STA.			INCREMENT	ACCUMULATED	ADDTL CA				UPPER END	LOWER END									
10	10.		12		0.000	0.000	0.000	0.000	0.000	0.000	6.840	0.000	237.026	236.779	49.391	0.005	8.000	Circular	1.110	0.000	0.000	0.000	
12	12	9			0.000	0.000	0.000	0.019	0.019	5.000	6.840	0.130	236.779	236.490	57.811	0.005	8.000	Circular	1.110	0.000	2.134	0.451	
11	11.		9		0.030	0.850	0.026	0.026	0.000	5.000	6.840	0.174	236.037	235.907	26.007	0.005	15.000	Circular	5.936	0.000	2.155	0.201	
9	9		8		0.000	0.000	0.000	0.045	0.000	5.201	6.840	0.304	235.809	235.760	9.717	0.005	15.000	Circular	5.936	0.000	2.545	0.064	
8	8.		7		0.002	0.600	0.001	0.046	0.000	5.265	6.840	0.313	235.661	235.590	14.180	0.005	15.000	Circular	5.936	0.000	2.565	0.092	
7	7		6		0.002	0.600	0.001	0.047	0.000	5.357	6.840	0.321	235.494	235.370	24.713	0.005	15.000	Circular	5.936	0.000	2.585	0.159	
6	6.		5		0.120	0.900	0.108	0.155	0.000	5.516	6.840	1.060	235.272	235.207	13.168	0.005	15.000	Circular	5.936	0.000	3.665	0.060	

PROJECT: NCE REC CENTER

DESIGNED BY: KG

Checked: JG

10 Year

INLET OR JUNCTION	INLET STATION	OUTLET WATER SURFACE ELEV.	DIA. PIPE (In)	DESIGN DISCH. Qo (CFS)	LENGTH PIPE (Lo) (Ft)	FRICTION SLOPE Sfo (Ft/Ft)	FRICTION LOSS Hf (Ft)	JUNCTION LOSS											Inlet Water Surface Elevation	Rim Elev	Comments			
								Vo (Ft)	Ho (Ft)	Qi	Vi	Q/Vi	V²/2g	Hf	Angle	Hd	Ht	1.3 Ht				0.5 Ht	FINAL H (Ft)	
6.		236.21	15	1.06	13.17	0.02%	0	3.66	0.05	0.32	2.59	0.83	0.1	0.04	60.51	0.06	0.15	0.19	FALSE	0.19	236.4	238.27	OK	-1.87
7		236.4	15	0.32	24.71	0.00%	0	2.59	0.03	0.31	2.57	0.8	0.1	0.04	90.98	0.07	0.13	0	FALSE	0.13	236.54	238.99	OK	-2.46
8.		236.59	15	0.31	14.18	0.00%	0	2.57	0.03	0.3	2.55	0.77	0.1	0.04	61.16	0.06	0.12	0	FALSE	0.12	236.71	239.02	OK	-2.31
9		236.76	15	0.3	9.72	0.00%	0	2.55	0.03	0.17	2.16	0.38	0.07	0.03	60	0.04	0.09	0	FALSE	0.09	236.85	239.03	OK	-2.18
12		237.02	8	0.13	57.81	0.01%	0	2.13	0.02	0	0	0	0	0	0	0	0.02	0	FALSE	0.02	237.04	239.06	OK	-2.02
10.		237.31	8	0	49.39	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	FALSE	0	237.31	239.01	OK	-2.79

11.		236.91	15	0.17	26.01	0.00%	0	2.16	0.02	0	0	0	0	0	0	0.02	0.02	FALSE	0.02	236.93	238.41	OK -1.48
-----	--	--------	----	------	-------	-------	---	------	------	---	---	---	---	---	---	------	------	-------	------	--------	--------	----------

Designed by: KH

Checked by: JG

STORM FREQUENCY  Year

UNITS	ENGLISH
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PIPE NO	FROM POINT		TO POINT		DRAIN AREA "A" Acres	RUNOFF COEFF "C"	CA			TOTAL INLET TIME (Minutes)	RAIN FALL In/Hr	RUNOFF Q (CFS)	INVERT ELEVATIONS		LENGTH OF Pipe Ft.	SLOPE Ft./ft. (in. In.)	SIZE (Dia Or Span/Rise) In.	SHAPE	Capacity CFS	Friction Slope Ft./Ft.	VEL Vn Ft/Sec	FLOW TIME Sec.	REMARKS
	REFERENCE	STA.	REFERENCE	STA.			INCREMENT	ACCUMULATED	ADDTL CA				UPPER END	LOWER END									
2	2		1		0.470	0.550	0.259	0.259	0.000	5.000	6.840	1.768	224.000	223.727	27.312	0.010	12.000	Circular	4.630	0.001	5.512	0.083	
1			EX STR		0.000	0.000	0.000	0.259	0.000	5.083	6.840	1.768	220.170	216.520	36.528	0.100	12.000	Circular	14.636	0.001	12.618	0.048	

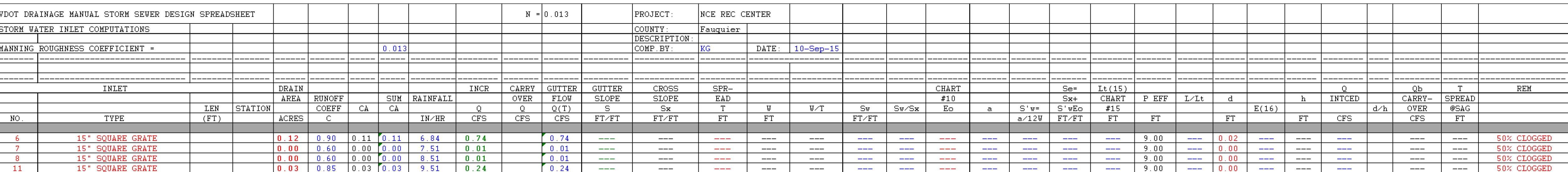
PROJECT: NCE REC CENTER

DESIGNED BY: KG

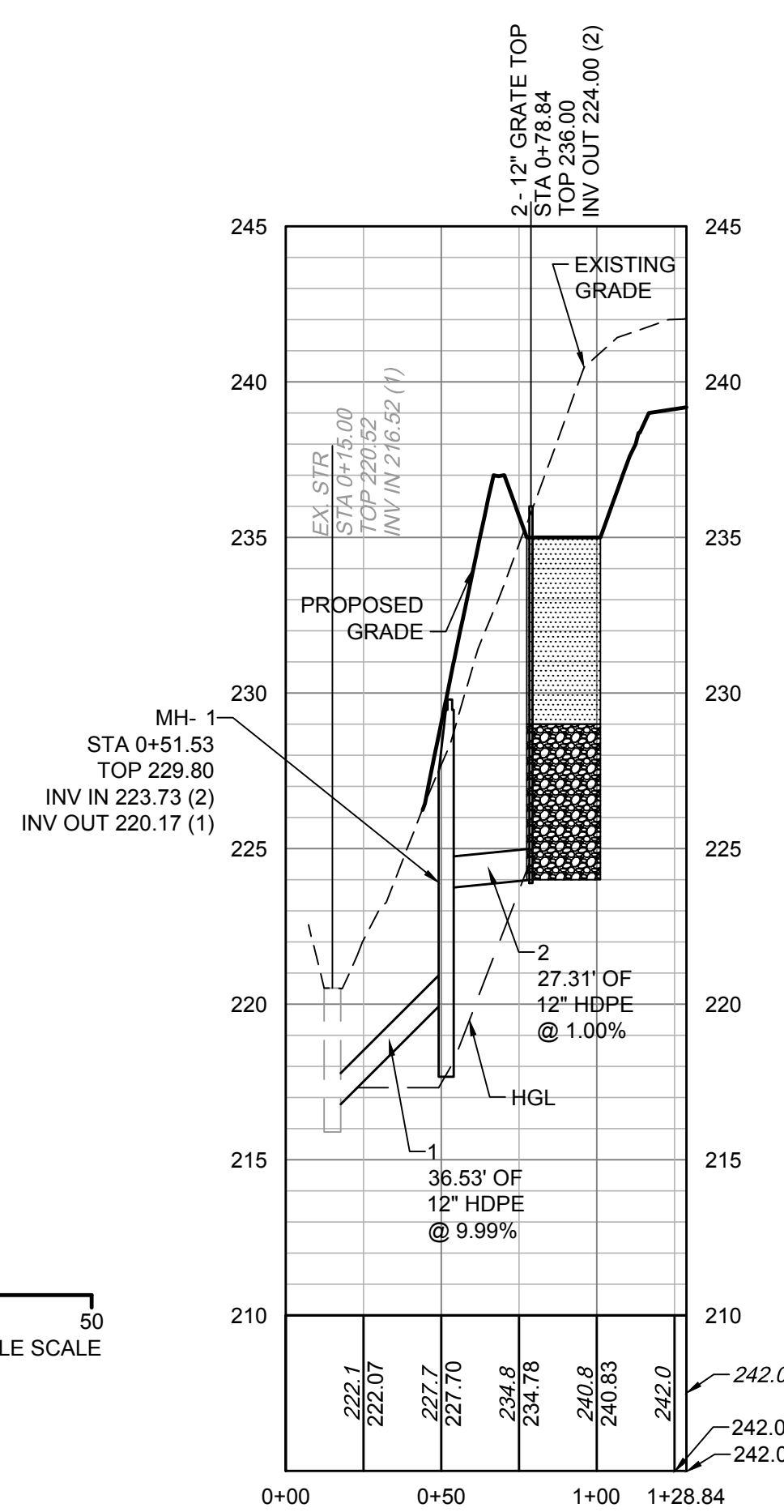
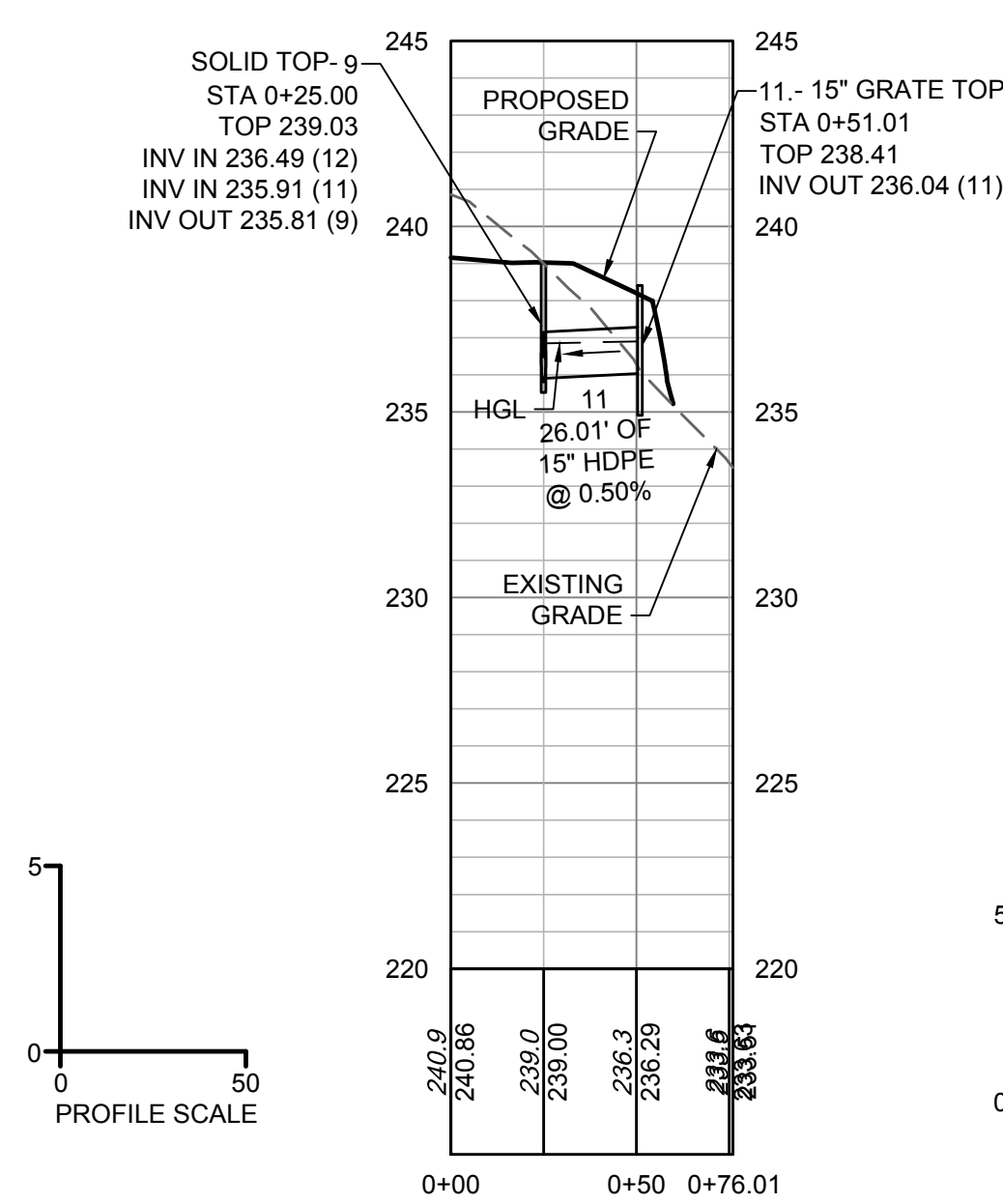
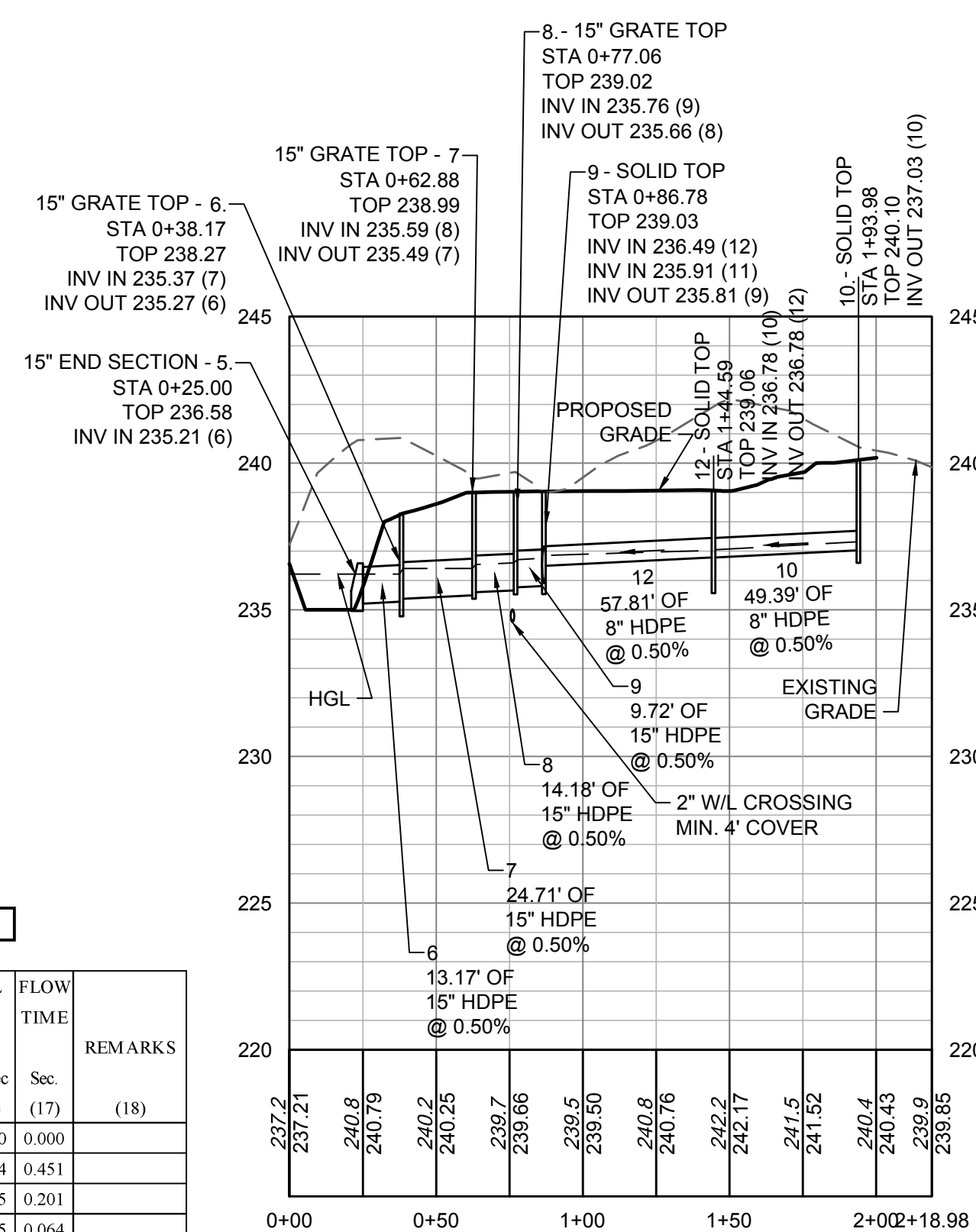
Checked: JG

**10 Year**

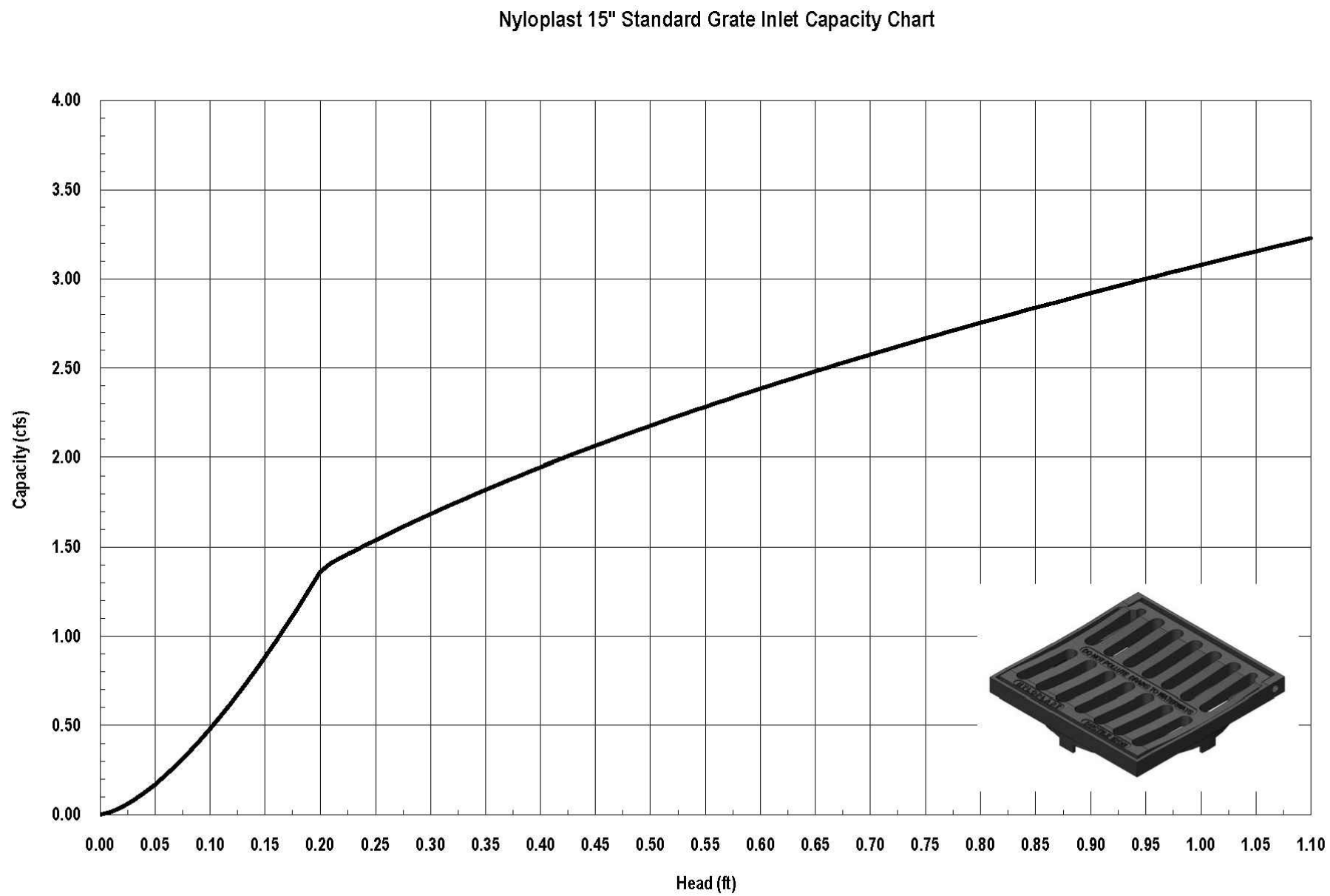
INLET OR JUNCTION	INLET STATION	OUTLET WATER SURFACE ELEV.	D/A PIPE DO (in)	DESIGN DISCH Qo (CFS)	LENGTH PIPE RPE (ft)	FRICTION SLOPE Sfo (ft/ft)	FRICTION LOSS Hf (ft)	JUNCTION LOSS												FINAL H (ft)	inlet Water Surface Elevation	Rim Elev	Comments	
								Vo	Ho	Qi	Vi	Q/Vi	V <sup>2</sup> /2g	H	Angle	Hd	Ht	1.3 Ht	0.5 Ht					
1		217.32	12	1.77	36.53	0.15%	0.05	12.62	0.62	1.77	5.51	9.75	0.47	0.17	0	0	0.78	0	FALSE	0.84	218.16	229.8	OK	-11.64
2		224.53	12	1.77	27.31	0.15%	0.04	5.51	0.12	0	0	0	0	0	0	0	0.12	0.15	FALSE	0.19	224.72	236	OK	-11.28



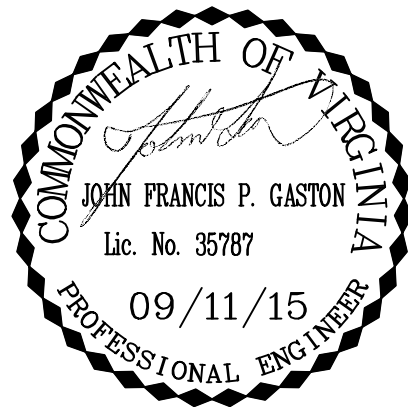
NOTE: INLET COMPUTATION DEPTHS FROM NYLOPLAST 15" STANDARD GRATE INLET CAPACITY CHART ON THIS SHEET.



- NOTES:
1. CONTRACTOR TO ANALYZE THE CONDITION OF THE EXISTING STORM INLET AND LET NGA STAFF KNOW IF REPLACEMENT IS NECESSARY. NGA STAFF SHALL DIRECT THE CONTRACTOR ON WHETHER TO REPLACE OR USE THE EXISTING STRUCTURE.
  2. SEE SHEET C6.3 FOR BMP MATERIAL DEPTHS AND UNDERDRAIN LOCATIONS.







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REVISION DESCRIPTION	DATE
35% SUBMISSION	04/29/15
RESPONSE TO COMMENTS/ 95% SUBMISSION	06/23/15
RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15	07/16/15
RESPONSE TO COMMENTS ON 100% SUBMISSION	09/11/15

DATE  
6/23/15

DRAWN BY  
KG

DESIGNED BY  
KG

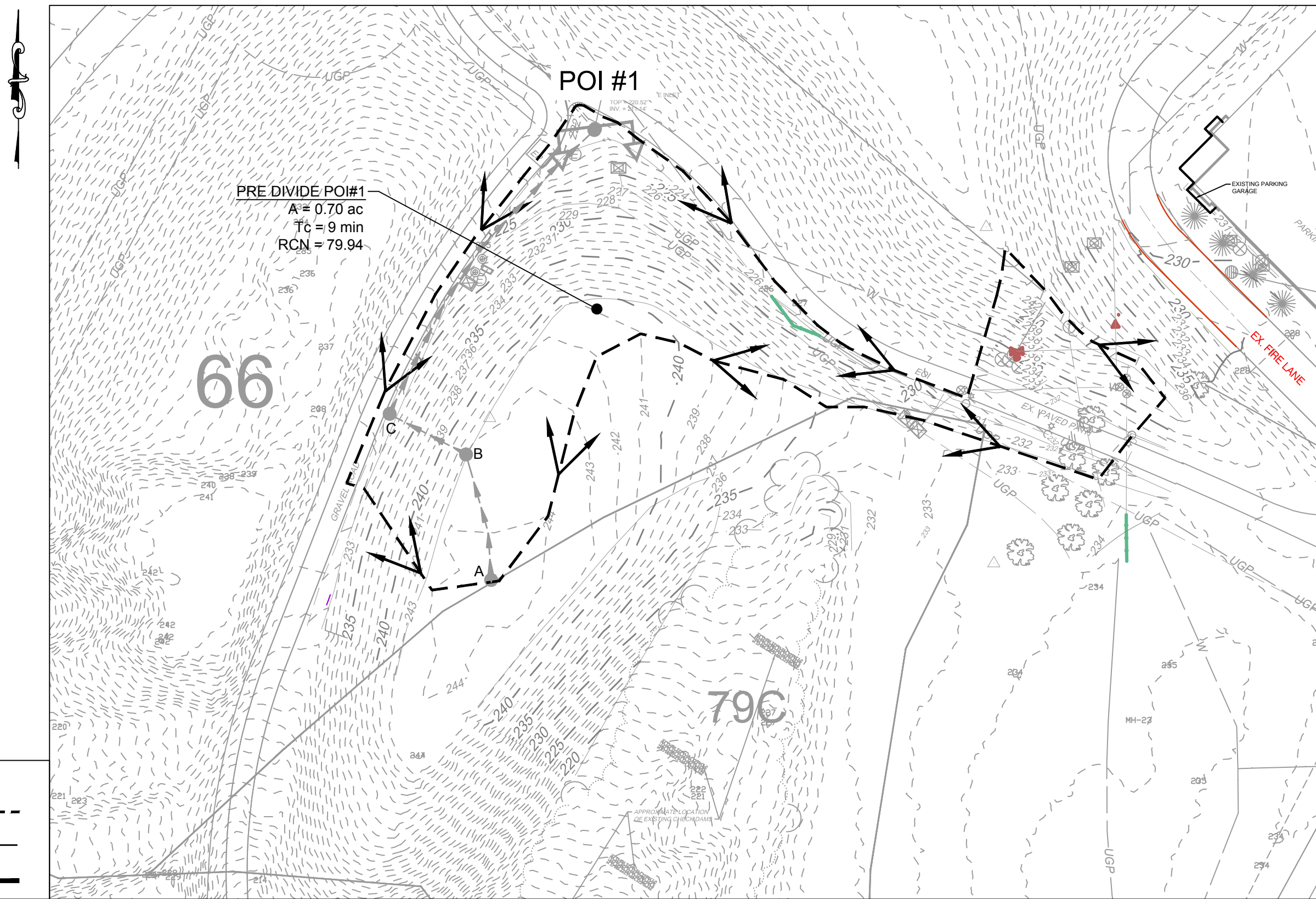
CHECKED BY  
JG

SCALE  
SEE PLAN

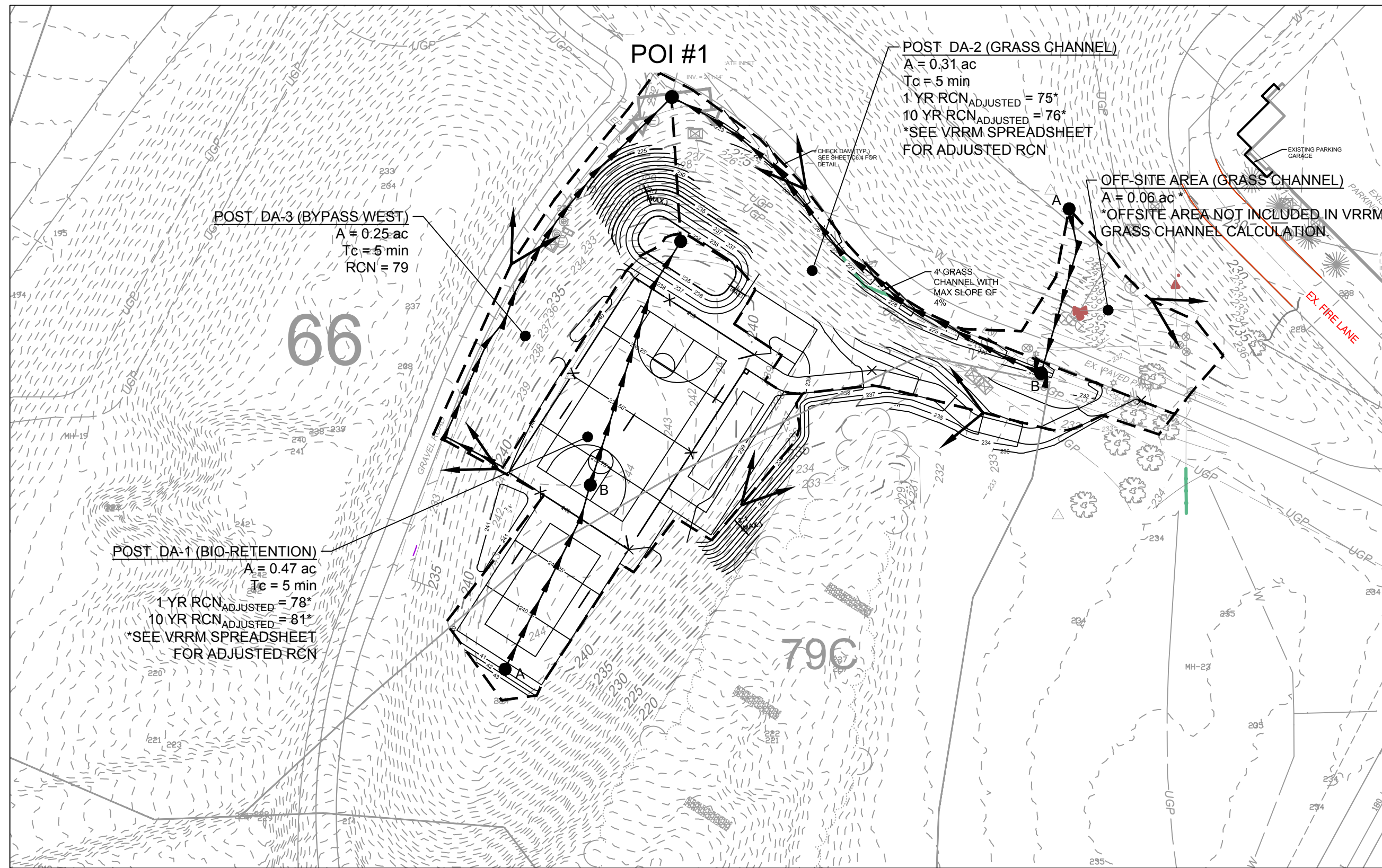
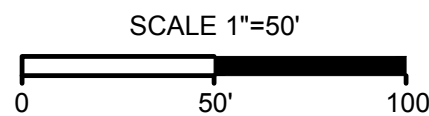
**TIMMONS GROUP**  
NCE RECREATIONAL FACILITY  
FT BELVOIR, VA  
PRE & POST DEVELOPED DRAINAGE

JOB NO.  
**36145**  
SHEET NO.  
**C5.0**

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PRE-DEVELOPED DRAINAGE DIVIDE TO POI#1



POST-DEVELOPED DRAINAGE DIVIDE TO POI#1

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS										
Site Conditions:	X	Existing	Proposed	Project:	NCE RECREATIONAL FACILITY					
				Subarea Number:	PRE DIVIDE POI #1					
On-Site Land Use:	X	Existing	Proposed	By:	KG		Date:	07.15.15		
RUNOFF CURVE NUMBER										
Soil Group	Land Use or Zoning			Area (acres)	RCN	RCN x Area				
Onsite Drainage Divide (LOC)	HSG			Land Cover						
66	C	Open Space Fair Condition		0.65	79	51.35				
79C	B	Open Space Fair Condition		0.01	69	0.69				
IMP		Impervious		0.04	98	3.92				
Total Area	0.70 ac		0.001 sq. mi		Weighted RCN		79.9			
TIME OF CONCENTRATION										
ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)		
Sheet Flow (P <sub>2</sub> = 3.20 in.)										
A	Grass: Dense grass	0.24	65	0.03	T <sub>c</sub> = 0.007 (nL) <sup>0.8</sup> / (P <sub>2</sub> ) <sup>0.5</sup> S <sup>0.4</sup>		0.14			
Shallow Concentrated										
B	Dense Grass	0.240	42	0.33	Fig. 3.1, TR-55		T <sub>c</sub> =L/3600V			
Channel Flow										
C	Grass, Weeds	0.030	168	0.05	2.52	12.61	3.80	0.01		
Pipe Flow										
Total T <sub>c</sub> (hr): 0.15										
Total T <sub>c</sub> (min): 9										
NOTE: THE 1 AND 10 YEAR PRE DEVELOPED PEAK DISCHARGES WERE CALCULATED WITH BENTLEY POND PACK SOFTWARE USING THE ABOVE TR-55 INFORMATION. PLEASE SEE SHEET C5.1 FOR PRE-DEVELOPED PEAK DISCHARGE INFORMATION.										

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS										
Site Conditions:	X	Existing	Proposed	Project:	NCE RECREATIONAL FACILITY					
				Subarea Number:	POST DIVIDE DA-1 BIO-RETENTION					
On-Site Land Use:	X	Existing	Proposed	By:	KG		Date:	7/14/2015		
RUNOFF CURVE NUMBER										
Soil Group	Land Use or Zoning			Area (acres)	RCN	RCN x Area				
Onsite Drainage Divide (LOC)	HSG			Land Cover						
66	C	Open space - fair condition		0.10	79	7.9				
79C	B	Open space - fair condition		0.07	69	4.83				
IMP		Impervious areas		0.30	98	29.4				
Total Area	0.47 ac		0.001 sq. mi		Weighted RCN =		89.64			
1 YR VRRM ADJUSTED RCN = 78.00										
10 YR VRRM ADJUSTED RCN = 81.00										
TIME OF CONCENTRATION										
ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)		
Sheet Flow (P <sub>2</sub> = 3.20 in.)										
A	Sand	0.029	100	0.01	T <sub>c</sub> = 0.007 (nL) <sup>0.8</sup> / (P <sub>2</sub> ) <sup>0.5</sup> S <sup>0.4</sup>		0.08			
Shallow Concentrated										
B	Asphalt	0.013	128	0.005	Fig. 3.1, TR-55		T <sub>c</sub> =L/3600V			
Channel Flow										
C	Dense Grass	0.013	230		T <sub>c</sub> =L/3600V		0.025			
Pipe Flow										
T <sub>c</sub> =L/3600V										
Total T <sub>c</sub> (hr): 0.08										
Total T <sub>c</sub> (min): 5										
NOTE: THE 1 AND 10 YEAR POST DEVELOPED PEAK DISCHARGES WERE CALCULATED WITH BENTLEY POND PACK SOFTWARE USING THE ADJUSTED RCN VALUE FROM THE VIRGINIA RUN-OFF REDUCTION METHOD SPREADSHEET. PLEASE SEE SHEET C5.1 FOR PEAK DISCHARGE SUMMARIES AND C6.1 FOR REDUCED RCN VALUES.										

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS										
Site Conditions:	X	Existing	Proposed	Project:	NCE RECREATIONAL FACILITY					
				Subarea Number:	POST DA-2 (GRASS CHANNEL)					
On-Site Land Use:	X	Existing	Proposed	By:	EA		Date:	6/23/2015		
RUNOFF CURVE NUMBER										
Soil Group	Land Use or Zoning			Area (acres)	RCN	RCN x Area				
Onsite Drainage Divide (LOC)	HSG			Land Cover						
66	C	Open space - fair condition		0.31	79	24.49				
79C	B	Open space - fair condition		0.02	69	1.38				
IMP		Impervious areas		0.04	98	3.92				
Total Area	0.37 ac		0.001 sq. mi		Weighted RCN =		80.51			
1 YR VRRM ADJUSTED RCN = 75.00										
10 YR VRRM ADJUSTED RCN = 76.00										
TIME OF CONCENTRATION										
ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)		
Sheet Flow (P <sub>2</sub> = 3.20 in.)										
A	Grass: Dense grass	0.025	85	0.01	T <sub>c</sub> = 0.007 (nL) <sup>0.8</sup> / (P <sub>2</sub> ) <sup>0.5</sup> S <sup>0.4</sup>		0.06			
Shallow Concentrated										
Fig. 3.1, TR-55										
T <sub>c</sub> =L/3600V										
Channel Flow										
C	Dense Grass	0.013	230		T <sub>c</sub> =L/3600V		0.01			
Pipe Flow										
T <sub>c</sub> =L/3600V										
Total T <sub>c</sub> (hr): 0.08										
Total T <sub>c</sub> (min): 5										

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS										
Site Conditions:	X	Existing	Proposed	Project:	NCE RECREATIONAL FACILITY					
				Subarea Number:	POST DA-3 BYPASS WEST					
On-Site Land Use:	X	Existing	Proposed	By:	EA		Date:	6/23/2015		
RUNOFF CURVE NUMBER										
Soil Group	Land Use or Zoning			Area (acres)	RCN	RCN x Area				
Onsite Drainage Divide (LOC)	HSG			Land Cover						
66	C	Open space - fair condition		0.25	79	19.75				
Total Area	0.25 ac		0.000 sq. mi		Weighted RCN =		79.00			
TIME OF CONCENTRATION										
ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)		
Sheet Flow (P <sub>2</sub> = 3.20 in.)										
A	Grass: Dense grass	0.025	100	0.01	T <sub>c</sub> = 0.007 (nL) <sup>0.8</sup> / (P <sub>2</sub> ) <sup>0.5</sup> S <sup>0.4</sup>		0.07			
Shallow Concentrated										
Fig. 3.1, TR-55										
T <sub>c</sub> =L/3600V										
Channel Flow										
B	Dense Grass	0.025			T <sub>c</sub> =L/3600V		0.01			
Pipe Flow										
T <sub>c</sub> =L/3600V										
Total T <sub>c</sub> (hr): 0.08										
Total T <sub>c</sub> (min): 5										

CHANNEL & FLOOD PROTECTION NARRATIVE:

THE PROJECT IS LOCATED ON THE EXISTING NGA FORT BELVOIR FACILITY IN FORT BELVOIR, VA. THE TOTAL SITE DISTURBANCE IS 0.96 ACRES AND THE STORMWATER MANAGEMENT HAS BEEN DESIGNED TO BE IN ACCORDANCE WITH THE 2011 VIRGINIA CODE AND THE 2011 VIRGINIA BMP CLEARINGHOUSE.

THE EXISTING SITE DRAINS TO A STRUCTURE LOCATED AT THE NORTH WEST CORNER OF THE PROPERTY. THIS SITE WILL BE DEVELOPED WITH A BASKETBALL COURT AND CONCRETE WALKWAY. THE OVERALL PROJECT TO BE BUILT AT A LATER DATE WILL ENTAIL ADDING A VOLLEYBALL COURT, HORSESHOE PIT, AND SHELTER. THE STORMWATER MANAGEMENT AND BMP REQUIREMENTS HAVE BEEN DESIGNED TO ACCOUNT FOR THE ADDITIONAL AMENITIES EVEN THOUGH THEY WILL NOT BE BUILT WITH THIS PROJECT.

THE SITE CHANNEL PROTECTION HAS BEEN ANALYZED TO A MANMADE STORMWATER CONVEYANCE SYSTEM (9 VAC 25-870-66 B 3). THE PEAK DISCHARGE REQUIREMENTS HAVE BEEN ANALYZED USING THE ENERGY BALANCE METHODOLOGY TO REDUCE THE POST DEVELOPED PEAK DISCHARGE TO WHAT IS REQUIRED BY THE ENERGY BALANCE EQUATION. THE SITE IS UTILIZING A LEVEL 2 BIO-RETENTION FACILITY AND GRASS CHANNEL TO REDUCE THE CURVE NUMBERS OF THE PROPOSED SITE AND REDUCE THE 1 YEAR POST DEVELOPED PEAK DISCHARGE. THE 1 YEAR PEAK DISCHARGE REQUIRED BY THE ENERGY BALANCE EQUATION IS 0.92 CFS AND THE POST DEVELOPED PEAK DISCHARGE IS 0.87 CFS. THUS MEETING THE ENERGY BALANCE EQUATION. THE BIO-RETENTION WAS ROUTED ACCOUNTING FOR STONE STORAGE UNDER THE BIO-RETENTION UTILIZING BENTLEY POND PACK SOFTWARE. THE 1 YEAR PRE AND POST DEVELOPED HYDROLOGY CALCULATIONS CAN BE FOUND ON SHEET C5.0 AND C5.1.

THE FLOOD PROTECTION HAS BEEN DESIGNED IN ACCORDING WITH (9 VAC 25-870-66 C. WATER QUANTITY) TO REDUCE THE POST DEVELOPED 10 YEAR PEAK DISCHARGE TO LESS THAN THE 10 YEAR PRE DEVELOPED PEAK DISCHARGE. THE EXISTING STORM SYSTEM DOES NOT CURRENTLY EXPERIENCE LOCALIZED FLOODING, THEREFORE THE PROPOSED BIO-RETENTION HAS BEEN ROUTED TO RELEASE THE 10 YEAR PEAK DISCHARGE LESS THAN THE PRE DEVELOPED. IN ORDER TO REDUCE THE FLOW, STORAGE HAS BEEN PROVIDED IN THE STONE SECTION UNDERNEATH THE BIO-RETENTION. THE PRE AND POST DEVELOPED PEAK DISCHARGES ARE 2.94 CFS AND 2.84 CFS, RESPECTIVELY. PLEASE SEE SHEET C5.0-C5.1 FOR THE 10 YEAR PRE AND POST DEVELOPED HYDROLOGY CALCULATIONS.

IN CONCLUSION, THE SITE ENERGY BALANCE HAS BEEN MET FOR THE POST DEVELOPED 1 YEAR DESIGN PEAK DISCHARGE. THE 10 YEAR POST DEVELOPED PEAK DISCHARGE HAS BEEN REDUCED TO LESS THAN THE PRE-DEVELOPED CONDITION, THEREFORE MEETING THE REQUIREMENTS SET FORTH IN THE 2011 VA CODE AND 2011 BMP CLEARING HOUSE.



DRAINAGE AREA 1 PRE DEVELOPED POI#1 (1 YEAR):

Subsection: Unit Hydrograph Summary		Return Event: 1 years
Label: DA-1		Storm Event: 1YR-NEW
Storm Event	1YR-NEW	
Return Event	1 years	
Duration	24,000 hours	
Depth	2.7 in	
Time of Concentration (Composite)	0.150 hours	
Area (User Defined)	0.700 acres	
Computational Time Increment	0.020 hours	
Time to Peak (Computed)	12.000 hours	
Flow (Peak, Computed)	0.99 ft <sup>3</sup> /s	
Output Increment	0.050 hours	
Time to Flow (Peak Interpolated Output)	12.000 hours	
Flow (Peak Interpolated Output)	0.99 ft <sup>3</sup> /s	TOTAL FLOW POI #1
Drainage Area		
SCS CN (Composite)	79.900	
Area (User Defined)	0.700 acres	
Maximum Retention (Pervious)	2.5 in	
Maximum Retention (Pervious, 20 percent)	0.5 in	
Cumulative Runoff		
Cumulative Runoff Depth (Pervious)	1.0 in	
Runoff Volume (Pervious)	2,602.4 ft <sup>3</sup>	
Hydrograph Volume (Area under Hydrograph curve)		
Volume	2,596.0 ft <sup>3</sup>	
SCS Unit Hydrograph Parameters		
Time of Concentration (Composite)	0.150 hours	
Computational Time Increment	0.020 hours	
Unit Hydrograph Shape Factor	483.432	
K Factor	0.749	
Receding/Rising, Tr/Tp	1.670	
Unit peak, qp	5.29 ft <sup>3</sup> /s	
Unit peak time, Tp	6.100 hours	
Unit receding limb, Tr	0.400 hours	
Total unit time, Tb	0.500 hours	

DA-1 POST DEVELOPED (1 YEAR):

Subsection: Unit Hydrograph Summary

Return Event: 1 years

Label: DA-1

Storm Event: 1YR-NEW

Storm Event	1YR-NEW
Return Event	1 years
Duration	24,000 hours
Depth	2.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.470 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	0.66 R <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.64 R <sup>3</sup> /s
Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	0.470 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.9 in
Runoff Volume (Pervious)	1,570.4 R <sup>3</sup>
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,568.0 R <sup>3</sup>
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.39 R <sup>3</sup> /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

DA-2 POST DEVELOPED (1 YEAR):

Subsection: Unit Hydrograph Summary

Label: DA-2

Return Event: 1 years

Storm Event: 1YR-NEW

Storm Event	1YR-NEW
Return Event	1 years
Duration	24,000 hours
Depth	2.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.370 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	0.42 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.42 ft³/s
Drainage Area	
SCS CN (Composite)	75.000
Area (User Defined)	0.370 acres
Maximum Retention (Pervious)	3.3 in
Maximum Retention (Pervious, 20 percent)	0.7 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	1,034.7 ft³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,033.0 ft³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.03 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

DA-3 POST DEVELOPED (1 YEAR):

Subsection: Unit Hydrograph Summary

Label: DA-3

Return Event: 1 years

Storm Event: 1YR-NEW

Storm Event	1YR-NEW
Return Event	1 years
Duration	24,000 hours
Depth	2.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.250 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	0.38 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.36 ft³/s
Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	0.250 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.0 in
Runoff Volume (Pervious)	884.0 ft³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	883.0 ft³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.40 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

1 YEAR POST DEVELOPED POI#1 SUMMARY:

Subsection: Master Network Summary

Catchments Summary							
Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)		
DA-1	Post-Development 1 year	1	1,568.0	11.950	0.64		
DA-2	Post-Development 1 year	1	1,033.0	11.950	0.42		
DA-3	Post-Development 1 year	1	883.0	11.950	0.36		
Node Summary							
Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)		
0-1	Post-Development 1 year	1	3,016.0	11.950	0.87		
TOTAL FLOW AT POI #1							
Pond Summary							
Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
PROPOSED BR (IN)	Post-Development 1 year	1	1,568.0	11.950	0.64	(N/A)	(N/A)
PROPOSED BR (OUT)	Post-Development 1 year	1	1,101.0	12.150	0.12	225.32	506.0

DRAINAGE AREA 1 PRE DEVELOPED POI#1 (10 YEAR):

Subsection: Unit Hydrograph Summary		Return Event: 10 years
Label: DA-1		Storm Event: 10YR-NEW
Storm Event	10YR-NEW	
Return Event	10 years	
Duration	24,000 hours	
Depth	5.2 in	
Time of Concentration (Composite)	0.150 hours	
Area (User Defined)	0.700 acres	
Computational Time Increment	0.020 hours	
Time to Peak (Computed)	11.980 hours	
Flow (Peak, Computed)	2.99 ft³/s	
Output Increment	0.050 hours	
Time to Flow (Peak Interpolated Output)	12.000 hours	
Flow (Peak Interpolated Output)	2.94 ft³/s	TOTAL FLOW POI #1
Drainage Area		
SCS Cn (Composite)	79.900	
Area (User Defined)	0.700 acres	
Maximum Retention (Pervious)	2.5 in	
Maximum Retention (Pervious, 20 percent)	0.5 in	
Cumulative Runoff		
Cumulative Runoff Depth (Pervious)	3.1 in	
Runoff Volume (Pervious)	7,772.2 ft³	
Hydrograph Volume (Area under Hydrograph curve)		
Volume	7,757.0 ft³	
SCS Unit Hydrograph Parameters		
Time of Concentration (Composite)	0.150 hours	
Computational Time Increment	0.020 hours	
Unit Hydrograph Shape Factor	483.432	
K Factor	0.749	
Receding/Rising, Tr/Tp	1.670	
Unit peak, qp	5.29 ft³/s	
Unit receding limb, Tr	0.400 hours	
Total unit time, Tb	0.500 hours	

DA-1 POST DEVELOPED (10 YEAR):

Subsection: Unit Hydrograph Summary		Return Event: 10 years
Label: DA-1		Storm Event: 10YR-NEW
Storm Event	10YR-NEW	
Return Event	10 years	
Duration	24,000 hours	
Depth	5.2 in	
Time of Concentration (Composite)	0.083 hours	
Area (User Defined)	0.470 acres	
Computational Time Increment	0.011 hours	
Time to Peak (Computed)	11.922 hours	
Flow (Peak, Computed)	2.33 ft <sup>3</sup> /s	
Output Increment	0.050 hours	
Time to Flow (Peak Interpolated Output)	11.900 hours	
Flow (Peak Interpolated Output)	2.25 ft <sup>3</sup> /s	
Drainage Area		
SCS CN (Composite)	81.000	
Area (User Defined)	0.470 acres	
Maximum Retention (Pervious)	2.3 in	
Maximum Retention (Pervious, 20 percent)	0.5 in	
Cumulative Runoff		
Cumulative Runoff Depth (Pervious)	3.2 in	
Runoff Volume (Pervious)	5,396.0 ft <sup>3</sup>	
Hydrograph Volume (Area under Hydrograph curve)		
Volume	5,390.0 ft <sup>3</sup>	
SCS Unit Hydrograph Parameters		
Time of Concentration (Composite)	0.083 hours	
Computational Time Increment	0.011 hours	
Unit Hydrograph Shape Factor	483.432	
K Factor	0.749	
Receding/Rising, Tr/Tp	1.670	
Unit peak, qp	6.39 ft <sup>3</sup> /s	
Unit peak time, Tp	0.056 hours	
Unit receding limb, Tr	0.222 hours	
Total unit time, Tb	0.278 hours	

DA-2 POST DEVELOPED (10 YEAR):

Subsection: Unit Hydrograph Summary

Return Event: 10 years

Label: DA-2

Storm Event: 10YR-NEW

Storm Event	10YR-NEW
Return Event	10 years
Duration	24,000 hours
Depth	5.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.370 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.58 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.50 ft <sup>3</sup> /s
Drainage Area	
SCS CN (Composite)	76.000
Area (User Defined)	0.370 acres
Maximum Retention (Pervious)	3.2 in
Maximum Retention (Pervious, 20 percent)	0.6 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.7 in
Runoff Volume (Pervious)	3,628.1 ft <sup>3</sup>
Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,623.0 ft <sup>3</sup>
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.03 ft <sup>3</sup> /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

DA-3 POST DEVELOPED (10 YEAR):

Subsection: Unit Hydrograph Summary

Return Event: 10 years

Label: DA-3

Storm Event: 10YR-NEW

Storm Event	10YR-NEW
Return Event	10 years
Duration	24,000 hours
Depth	5.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.250 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.17 R <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.12 R <sup>3</sup> /s
Drainage Area	
SCS CN (Composite)	79.000
Area (User Defined)	0.250 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.0 in
Runoff Volume (Pervious)	2,699.5 R <sup>3</sup>
Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,696.0 R <sup>3</sup>
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.40 R <sup>3</sup> /s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

10 YEAR POST DEVELOPED POI#1 SUMMARY:

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft <sup>3</sup> )	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
DA-1	Post-Development 10 year	10	5,390.0	11.900	2.25
DA-2	Post-Development 10 year	10	3,623.0	11.900	1.50
DA-3	Post-Development 10 year	10	2,696.0	11.900	1.12

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft <sup>3</sup> )	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
0-1	Post-Development 10 year	10	10,860.0	12.000	2.84

TOTAL FLOW AT POI #1

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft <sup>3</sup> )	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft <sup>3</sup> )
PROPOSED BR (IN)	Post-Development 10 year	10	5,390.0	11.900	2.25	(N/A)	(N/A)
PROPOSED BR (OUT)	Post-Development 10 year	10	4,541.0	12.100	0.71	229.42	2,020.0

10 YEAR PEAK DISCHARGE SUMMARY:

TOTAL POI #1 PRE	2.94 CFS
TOTAL POI #1 POST	2.84 CFS
2.84 CFS < 2.94 CFS FLOOD PROTECTION MET	

BIO-RETENTION RISER DATA:

Input Data		Structure ID: Riser		
Structure ID: 12" HDPE		Structure Type: Stand Pipe		
Structure Type: Culvert-Circular		Number of Openings		1
Number of Barrels		1		
Diameter		12.0 in		
Length		27.31 ft		
Length (Computed Barrel)		27.31 ft		
Slope (Computed)		0.010 R/Ft		
Outlet Control Data				
Manning's n		0.012		
Ke		0.500		
Kb		0.027		
Kj		0.000		
Convergence Tolerance		0.00 ft		
Inlet Control Data				
Equation Form		Form 1		
K		0.0098		
M		2.0000		
C		0.0398		
V		0.6700		
T1 ratio (HW/D)		1.155		
T2 ratio (HW/D)		1.302		
Slope Correction Factor		-0.500		
Structure ID: Riser		Structure Type: Stand Pipe		
Number of Openings		1		
Elevation		236.00 ft		
Diameter		12.0 in		
Orifice Area		0.6 ft²		
Orifice Coefficient		0.600		
Weir Length		0.00 ft		
Weir Coefficient		3.00 (ft <sup>0.5</sup> /s)		
K Reverse		1.000		
Manning's n		0.000		
Ke, Charged Riser		0.000		
Weir Submergence		False		
Orifice In to Crest		False		
Structure ID: Orifice - 2"		Structure Type: Orifice-Circular		
Number of Openings		1		
Elevation		224.00 ft		
Orifice Diameter		2.0 in		
Orifice Coefficient		0.600		
Structure ID: Orifice - 4"		Structure Type: Orifice-Circular		
Number of Openings		1		
Elevation		228.00 ft		
Orifice Diameter		4.0 in		
Orifice Coefficient		0.600		







Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014				
To be used w/ 2011 BMP Standards and Specifications				
Site Data				

<b>Project Name:</b> NCE Outdoor Rec Center					
<b>Date:</b> 09.09.15					
	data input cells				
	calculation cells				
	constant values				

<b>Total Disturbed Acreage</b>	<b>0.96</b>
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Constants			
Annual Rainfall (inches)	43		
Target Rainfall Event (inches)	1.00		
Phosphorus EMC (mg/L)	0.26	Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41		
Pj	0.90		

Pre-ReDevelopment Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.27	0.65	0.00	0.92
Impervious Cover (acres)	0.00	0.00	0.04	0.00	0.04
			<b>Total</b>		0.96

Post-ReDevelopment Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forests/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.20	0.40	0.00	0.60
Impervious Cover (acres)	0.00	0.07	0.29	0.00	0.36
				<b>Total</b>	0.96

Rv Coefficients				
	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary Pre-Development		Listed	Adjusted <sup>1</sup>		Land Cover Summary Post-ReDevelopment	
Forest/Open Space Cover (acres)		0.00	0.00		Forest/Open Space Cover	0.00
Composite Rv(forest)		0.00	0.00		Composite Rv(forest)	0.00
% Forest		0%	0%		% Forest	0%
Managed Turf Cover (acres)		0.92	0.60		Managed Turf Cover (acres)	0.60
Composite Rv(turf)		0.21	0.21		Composite Rv(turf)	0.21
% Managed Turf		96%	94%		% Managed Turf	94%
Impervious Cover (acres)		0.04	0.04		ReDev. Impervious Cover (acres)	0.04
Rv(impervious)		0.95	0.95		Rv(impervious)	0.95
% Impervious		4%	6%		% Impervious	6%
Total Site Area (acres)		0.96	0.64		Total ReDev. Site Area (acres)	0.64
Site Rv		0.24	0.26		ReDev. Site Rv	0.26
					Post-ReDevelopment Treatment Volume (acre-ft)	0.0138
Pre-Development Treatment Volume (acre-ft)	0.0196	0.0138			Post-ReDevelopment Treatment Volume (cubic feet)	603
Pre-Development Treatment Volume (cubic feet)	853	603			Post-ReDevelopment Load (TP) (lb/yr)	0.38
Pre-Development Load (TP) (lb/yr)	0.54	0.38				

<sup>1</sup> **Adjusted Land Cover Summary** reflects the pre redevelopment and cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in **Column I**.

			Total Load Reduction Required (lb/yr)	0.60
Pre-Development Load (TN) (lb/yr)	3.83		Post-Development Load (TN) (lb/yr)	7.67

### Drainage Area A

Drainage Area A Land Cover (acres)													
	A soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv							
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.01	0.00	0.01	0.04							
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.07	0.09	0.00	0.16	0.21							
Impervious Cover (acres)	0.00	0.07	0.23	0.00	0.30	0.95							
			Total		0.47	Post Development Treatment Volume (cf)				1159			
Credit	Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Phosphorus Load from Upstream RR Practices (lbs)	Untreated Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)	
6. b. Bioretention #2 (Spec #9)	impervious acres draining to bioretention	80% runoff volume reduction	0.80	0.30	0	828	207	50	0.00	0.65	0.58	0.06	
	turf acres draining to bioretention	80% runoff volume reduction	0.80	0.16	0	98	25	50	0.00	0.08	0.07	0.01	

## Drainage Area B

Drainage Area B Land Cover (acres)																				
A soils		B Soils		C Soils		D Soils		Totals		Land Cover Rv										
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land		0.00		0.00		0.00		0.00		0.00										
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed		0.00		0.02		0.25		0.00		0.27										
Impervious Cover (acres)		0.00		0.02		0.02		0.00		0.04										
						Total		0.31				Post Development Treatment Volume (cf)								
												352								
Credit			Unit	Description of Credit	Credit	Credit Area (acres)	Volume from Upstream RR Practice (cf)	Runoff Reduction (cf)	Remaining Runoff Volume (cf)	Phosphorus Efficiency (%)	Phosphorus Load from Upstream RR Practices (lbs)	Untreated Phosphorus Load to Practice (lbs.)	Phosphorus Removed By Practice (lbs.)	Remaining Phosphorus Load (lbs.)						
4.b. Grass Channel C/D Soils (Spec #3)	impervious acres draining to grass channels			10% runoff volume reduction	0.10	0.04	0	14	124	15	0.00	0.09	0.02	0.07						
	turf acres draining to grass channels			10% runoff volume reduction	0.10	0.27	0	21	193	15	0.00	0.13	0.03	0.10						

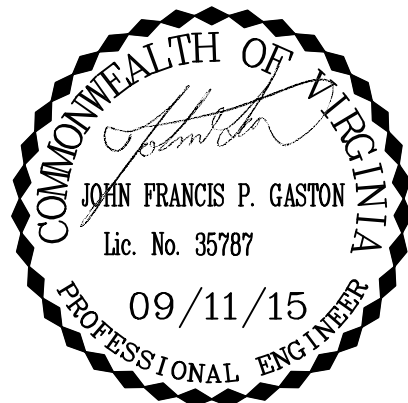
## Phosphorous

TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	0.60			
RUNOFF REDUCTION (cf)	961			
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	0.71			
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	0.37			
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 0.1 LB/YEAR!!			

Target Rainfall Event (in)		1-year storm	2-year storm	10-year storm
		2.70	3.20	5.20
<b>Drainage Area A</b>				
Drainage Area (acres)		0.47		
Runoff Reduction Volume (cf)		926		
<b>Drainage Area B</b>				
Drainage Area (acres)		0.31		
Runoff Reduction Volume (cf)		35		
<b>Drainage Area C</b>				
Drainage Area (acres)		0.00		
Runoff Reduction Volume (cf)		0		
<b>Drainage Area D</b>				
Drainage Area (acres)		0.00		
Runoff Reduction Volume (cf)		0		
<b>Drainage Area E</b>				
Drainage Area (acres)		0.00		
Runoff Reduction Volume (cf)		0		

Based on the use of Runoff Reduction practices in the selected drainage areas, the spreadsheet calculates an adjusted  $RV_{\text{Developed}}$  and adjusted Curve Number.

<b>Drainage Area A</b>		<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.01	0.00	
	CN	30	55	70	77	
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.07	0.09	0.00	
	CN	39	61	74	80	
	Area (acres)	0.00	0.07	0.23	0.00	
Impervious Cover	CN	98	98	98	98	
					<b>Weighted CN</b>	<b>S</b>
					87	1.49
<b>RV<sub>Developed</sub> (in) with no Runoff Reduction</b>		<b>1-year storm</b>	<b>2-year storm</b>	<b>10-year storm</b>		
		1.48	1.91	3.76		
	<b>RV<sub>Developed</sub> (in) with Runoff Reduction</b>	0.94	1.37	3.21		
	<b>Adjusted CN</b>	78	79	81		
<b>Drainage Area B</b>		<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.00	0.00	
	CN	30	55	70	77	
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.02	0.25	0.00	
	CN	39	61	74	80	
	Area (acres)	0.00	0.02	0.02	0.00	
Impervious Cover	CN	98	98	98	98	
					<b>Weighted CN</b>	<b>S</b>
					76	3.16
<b>RV<sub>Developed</sub> (in) with no Runoff Reduction</b>		<b>1-year storm</b>	<b>2-year storm</b>	<b>10-year storm</b>		
		0.82	1.15	2.70		
	<b>RV<sub>Developed</sub> (in) with Runoff Reduction</b>	0.79	1.12	2.67		
	<b>Adjusted CN</b>		75	75	76	



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DATE	REVISION DESCRIPTION
04/29/15	35% SUBMISSION
06/23/15	RESPONSE TO COMMENTS/ 95% SUBMISSION
07/16/15	RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15
09/11/15	RESPONSE TO COMMENTS ON 100% SUBMISSION

DATE  
6/23/15

KG

DESIGNED BY

KG
CHECKED BY

JG

SCALE

SEE PLAN

# TIMMONS GROUP

<h1 style="text-align: center;">NCE RECREATIONAL FACILITY</h1>	JOB NO.	36145
	SHEET NO.	C6.1
FT BELVOIR, VA		VDRM CON ARCHITECTS

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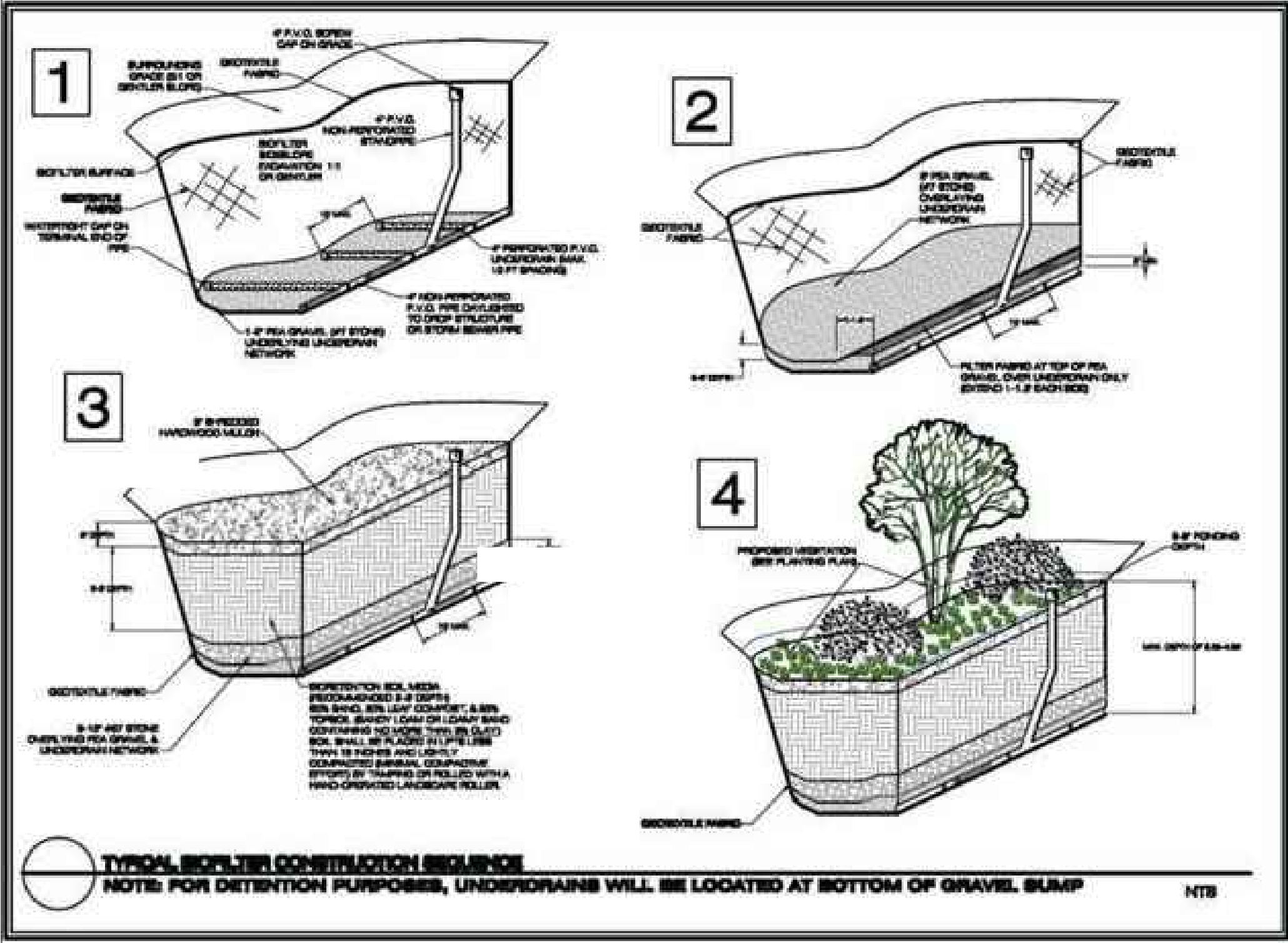


BIORETENTION INSTALLATION

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL A BIORETENTION BASIN. THE INSTALLATION OF A BIORETENTION BASIN WILL INCLUDE INTERMEDIATE INSPECTIONS AT CRITICAL STAGES OF CONSTRUCTION WITH INSPECTOR SIGN-OFF THAT THE PARTICULAR ELEMENTS OF THE BIORETENTION ARE CONSTRUCTED ACCORDING TO THE APPROVED PLANS AND SPECIFICATIONS. AS AN ALTERNATIVE, IF ALLOWED BY THE VSPM AUTHORITY, THE CONTRACTOR MAY RELY ON THE ENGINEER OF RECORD OR OTHER QUALIFIED INDIVIDUAL TO CONDUCT THE INTERMEDIATE INSPECTIONS AND CERTIFICATIONS OF COMPLIANCE. THE CONSTRUCTION SEQUENCE FOR MICRO-BIORETENTION IS MORE SIMPLIFIED. THESE STEPS MAY BE MODIFIED TO REFLECT DIFFERENT BIORETENTION APPLICATIONS OR EXPECTED SITE CONDITIONS:

1. CONSTRUCTION OF THE BIORETENTION AREA MAY ONLY BEGIN AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED WITH VEGETATION. IT MAY BE NECESSARY TO BLOCK CERTAIN CURB OR OTHER INLETS WHILE THE BIORETENTION AREA IS BEING CONSTRUCTED. THE PROPOSED SITE SHOULD BE CHECKED FOR EXISTING UTILITIES PRIOR TO ANY EXCAVATION.
2. THE DESIGNER AND THE INSTALLER SHOULD HAVE A PRECONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO ORIGINAL DESIGN. SINCE OTHER CONTRACTORS MAY BE RESPONSIBLE FOR CONSTRUCTING PORTIONS OF THE SITE, IT IS QUITE COMMON TO FIND SUBTLE DIFFERENCES IN SITE GRADING, DRAINAGE AND PAVING ELEVATIONS THAT CAN PRODUCE HYDRAULICALLY IMPORTANT DIFFERENCES FOR THE PROPOSED BIORETENTION AREA. THE DESIGNER SHOULD CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED DURING THE PRECONSTRUCTION MEETING TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.
3. TEMPORARY E&S CONTROLS ARE NEEDED DURING CONSTRUCTION OF THE BIORETENTION AREA TO DIVERT STORMWATER AWAY FROM THE BIORETENTION AREA UNTIL IT IS COMPLETED. SPECIAL PROTECTION MEASURES SUCH AS EROSION CONTROL FABRICS MAY BE NEEDED TO PROTECT VULNERABLE SIDE SLOPES FROM EROSION DURING THE CONSTRUCTION PROCESS.
4. ANY PRE-TREATMENT CELLS SHOULD BE EXCAVATED FIRST AND THEN SEALED TO TRAP SEDIMENTS.
5. EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE BIORETENTION AREA TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS. EXCAVATING EQUIPMENT SHOULD HAVE SCOOPS WITH ADEQUATE REACH SO THEY DO NOT HAVE TO SIT INSIDE THE FOOTPRINT OF THE BIORETENTION AREA. CONTRACTORS SHOULD USE A CELL CONSTRUCTION APPROACH IN LARGER BIORETENTION BASINS, WHEREBY THE BASIN IS SPLIT INTO 500 TO 1,000 SQ. FT. TEMPORARY CELLS WITH A 10-15 FOOT EARTH BRIDGE IN BETWEEN, SO THAT CELLS CAN BE EXCAVATED FROM THE SIDE.
6. IT MAY BE NECESSARY TO RIP THE BOTTOM SOILS TO A DEPTH OF 6 TO 12 INCHES TO PROMOTE GREATER INFILTRATION.
7. PLACE GEOTEXTILE FABRIC ON THE SIDES OF THE BIORETENTION AREA WITH A 6-INCH OVERLAP ON THE SIDES. IF A STONE STORAGE LAYER WILL BE USED, PLACE THE APPROPRIATE DEPTH OF #57 STONE ON THE BOTTOM, INSTALL THE PERFORATED UNDERRAIN PIPE, PACK #57 STONE TO 3 INCHES ABOVE THE UNDERDRAIN PIPE, AND ADD APPROXIMATELY 3 INCHES OF CHOKER STONE/PEA GRAVEL AS A FILTER BETWEEN THE UNDERDRAIN AND THE SOIL MEDIA LAYER. IF NO STONE STORAGE LAYER IS USED, START WITH 6 INCHES OF #57 STONE ON THE BOTTOM, AND PROCEED WITH THE LAYERING AS DESCRIBED ABOVE.
8. OBTAIN SOIL THE MEDIA FROM A QUALIFIED VENDOR, AND STORE IT ON AN ADJACENT IMPERVIOUS AREA OR PLASTIC SHEETING. AFTER VERIFYING THAT THE MEDIA MEETS THE SPECIFICATIONS, APPLY THE MEDIA IN 12-INCH LIFTS UNTIL THE DESIRED TOP ELEVATION OF THE BIORETENTION AREA IS ACHIEVED. WAIT A FEW DAYS TO CHECK FOR SETTLEMENT, AND ADD ADDITIONAL MEDIA, AS NEEDED, TO ACHIEVE THE DESIGN ELEVATION.
9. PREPARE PLANTING HOLES FOR ANY TREES AND SHRUBS, INSTALL THE VEGETATION, AND WATER ACCORDINGLY. INSTALL ANY TEMPORARY IRRIGATION.
10. PLACE THE SURFACE COVER IN BOTH CELLS (MULCH, RIVER STONE OR TURF), DEPENDING ON THE DESIGN. IF COIR OR JUTE MATTING WILL BE USED IN LIEU OF MULCH, THE MATTING WILL NEED TO BE INSTALLED PRIOR TO PLANTING (STEP 9), AND HOLES OR SLITS WILL HAVE TO BE CUT IN THE MATTING TO INSTALL THE PLANTS.
11. INSTALL THE PLANT MATERIALS AS SHOWN IN THE LANDSCAPING PLAN, AND WATER THEM DURING WEEKS OF NO RAIN FOR THE FIRST TWO MONTHS.

BIORETENTION CONSTRUCTION SEQUENCE



SOURCE: VIRGINIA STORMWATER BMP CLEARINGHOUSE SPECIFICATION NO. 9 (BIORETENTION)

CONSTRUCTION INSPECTION

INSPECTIONS DURING AND IMMEDIATELY AFTER CONSTRUCTION ARE NEEDED TO ENSURE THAT ALL THE ELEMENTS OF BIORETENTION BASINS ARE BUILT IN ACCORDANCE WITH THESE SPECIFICATIONS. USE A DETAILED INSPECTION CHECKLIST THAT REQUIRES SIGN-OFFS BY QUALIFIED INDIVIDUALS AT CRITICAL STAGES OF CONSTRUCTION AND TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENT. THE FOLLOWING IDENTIFIES THE CRITICAL STAGES OF CONSTRUCTION WHERE AN INTERMEDIATE INSPECTION AND SIGN-OFF BY A QUALIFIED INDIVIDUAL IS RECOMMENDED SINCE THE ITEMS CAN'T BE VERIFIED AFTER CONSTRUCTION IS COMPLETED. A CONSTRUCTION INSPECTION CHECKLIST THAT INCLUDES CERTIFICATIONS OF INSPECTION AT CRITICAL STAGES IS PROVIDED AT THE END OF THIS SPECIFICATION.

- THE FOLLOWING REPRESENTS ITEMS THAT ARE FREQUENTLY OVERLOOKED DURING CONSTRUCTION INSPECTION BUT REPRESENT IMPORTANT ELEMENTS FOR ENSURING THE SUCCESS OF THE BIORETENTION FACILITY DURING THE INITIAL BREAK-IN PERIOD.
1. VERIFY THE PROPER COVERAGE AND DEPTH OF MULCH, VEGETATION, OR SOIL MATTING HAS BEEN ACHIEVED FOLLOWING CONSTRUCTION, BOTH ON THE FILTER BED AND THE SIDE-SLOPES.
2. INSPECT THE PRE-TREATMENT FORBAYS AND FILTER STRIPS TO VERIFY THAT THEY ARE PROPERLY INSTALLED, STABILIZED, AND WORKING EFFECTIVELY BEFORE OPENING THE FACILITY TO RUNOFF.
3. CHECK THAT OUTFALL PROTECTION/ENERGY DISSIPATION MEASURES AT CONCENTRATED INFLOW AND OUTFLOW POINTS ARE STABLE.

UPON FINAL ACCEPTANCE OF THE FACILITY, LOG THE PRACTICE'S GPS COORDINATES AND SUBMIT THEM FOR ENTRY INTO THE VSPM AUTHORITY'S BMP MAINTENANCE TRACKING DATABASE.

BIORETENTION MATERIAL SPECIFICATIONS

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: <ul style="list-style-type: none"><li>80% - 90% sand</li><li>10%-20% soil fines</li><li>3%-5% organic matter</li></ul>	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Available P between L+ and M per DCOR 2005 Nutrient Management Criteria.	The media should be certified by the supplier.
Mulch Layer	Use aged, shredded hardwood bark mulch or stable coarse compost.	Layer a 2 to 3 inch layer on the surface of the filter bed.
Alternative Surface Cover	Use river stone or pea gravel, coir and jute matting, or turf cover.	Layer a 2 to 3 inch layer of to suppress weed growth.
Top Soil For Turf Cover	Loamy sand or sandy loam texture, with less than 5% clay content, pH corrected to between 6 and 7, and an organic matter content of at least 2%.	3 inch surface depth.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent)	Apply only to the sides and directly above the underdrain. For hotspots and certain karst sites only, use an appropriate liner on bottom.
Choking Layer	Layer a 2 to 4 inch layer of sand over a 2 inch layer of choker stone (typically #8 or #89 washed gravel), which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	underdrain; 12 to 18 inches for the stone storage layer, if needed
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe (or equivalent corrugated HDPE for micro-bioretention), with 3/8-inch perforations at 6 inches on center; position each underdrain on a 1% or 2% slope located no more than 20 feet from the next pipe.	Layer the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with vented caps at the T's and Y's.
Plant Materials	Plant one tree per 250 square feet (15 feet on-center, minimum 1 inch caliper). Shrubs a minimum of 30 inches high planted a minimum of 10 feet on-center. Plant ground cover plugs at 12 to 18 inches on-center; Plant container-grown plants at 18 to 24 inches on-center, depending on the initial plant size and how large it will grow.	Establish plant materials as specified in the landscaping plan and the recommended plant list. In general, plant spacing must be sufficient to ensure the plant material achieves 80% cover in the proposed planting areas within a 3-year period. If seed mixes are used, they should be from a qualified supplier, should be appropriate for stormwater basin applications, and should consist of native species (unless the seeding is to establish maintained turf).

SOURCE: VIRGINIA STORMWATER BMP CLEARINGHOUSE SPECIFICATION NO. 9 (BIORETENTION)

BIORETENTION MAINTENANCE:

MAINTENANCE AGREEMENTS

- THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (9VAC25-870-112). SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSPM AUTHORITY, AND SETS FORTH INSPECTION REQUIREMENTS, COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED, NOTIFICATION OF THE LOCAL PROGRAM UPON TRANSFER OF OWNERSHIP, AND RIGHT-OF-ENTRY FOR LOCAL PROGRAM PERSONNEL.
- ALL BIORETENTION PRACTICES MUST INCLUDE A LONG TERM MAINTENANCE AGREEMENTS CONSISTENT WITH THE PROVISIONS OF THE VSPM REGULATIONS, AND MUST INCLUDE THE RECOMMENDED MAINTENANCE TASKS AND A COPY OF AN ANNUAL INSPECTION CHECKLIST.
  - WHEN MICRO-SCALE BIORETENTION PRACTICES ARE APPLIED ON PRIVATE RESIDENTIAL LOTS, HOMEOWNERS SHOULD BE EDUCATED REGARDING THEIR ROUTINE MAINTENANCE NEEDS BY BEING PROVIDED A SIMPLE DOCUMENT THAT EXPLAINS THEIR PURPOSE AND ROUTINE MAINTENANCE NEEDS.
  - A DEED RESTRICTION, DRAINAGE EASEMENT OR OTHER MECHANISM ENFORCEABLE BY THE VSPM AUTHORITY MUST BE IN PLACE TO HELP ENSURE THAT RAIN GARDENS AND BIORETENTION FILTERS ARE MAINTAINED AND NOT CONVERTED OR DISTURBED, AS WELL AS TO PASS THE KNOWLEDGE ALONG TO ANY SUBSEQUENT OWNERS.
  - THE MECHANISM SHOULD, IF POSSIBLE, GRANT AUTHORITY FOR THE VSPM AUTHORITY TO ACCESS THE PROPERTY FOR INSPECTION OR CORRECTIVE ACTION.

FIRST YEAR MAINTENANCE OPERATIONS

- SUCCESSFUL ESTABLISHMENT OF BIORETENTION AREAS REQUIRES THAT THE FOLLOWING TASKS BE UNDERTAKEN IN THE FIRST YEAR FOLLOWING INSTALLATION:
- INITIAL INSPECTIONS. FOR THE FIRST 6 MONTHS FOLLOWING CONSTRUCTION, THE SITE SHOULD BE INSPECTED AT LEAST TWICE AFTER STORM EVENTS THAT EXCEED 1/2 INCH OF RAINFALL.
  - SPOT RESEEDING. INSPECTORS SHOULD LOOK FOR BARE OR ERODING AREAS IN THE CONTRIBUTING DRAINAGE AREA OR AROUND THE BIORETENTION AREA, AND MAKE SURE THEY ARE IMMEDIATELY STABILIZED WITH GRASS COVER.
  - FERTILIZATION. ONE-TIME, SPOT FERTILIZATION MAY BE NEEDED FOR INITIAL PLANTINGS.
  - WATERING. WATERING IS NEEDED ONCE A WEEK DURING THE FIRST 2 MONTHS, AND THEN AS NEEDED DURING FIRST GROWING SEASON (APRIL-OCTOBER), DEPENDING ON RAINFALL.
  - REMOVE AND REPLACE DEAD PLANTS. SINCE UP TO 10% OF THE PLANT STOCK MAY DIE OFF IN THE FIRST YEAR, CONSTRUCTION CONTRACTS SHOULD INCLUDE A CARE AND REPLACEMENT WARRANTY TO ENSURE THAT VEGETATION IS PROPERLY ESTABLISHED AND SURVIVES DURING THE FIRST GROWING SEASON FOLLOWING CONSTRUCTION. THE TYPICAL THRESHOLDS BELOW WHICH REPLACEMENT IS REQUIRED ARE 85% SURVIVAL OF PLANT MATERIAL AND 100% SURVIVAL OF TREES.

MAINTENANCE INSPECTIONS

- IT IS HIGHLY RECOMMENDED THAT A SPRING MAINTENANCE INSPECTION AND CLEANUP BE CONDUCTED AT EACH BIORETENTION AREA. THE FOLLOWING IS A LIST OF SOME OF THE KEY MAINTENANCE PROBLEMS TO LOOK FOR:
- CHECK TO SEE IF 75% TO 90% COVER (MULCH PLUS VEGETATIVE COVER) HAS BEEN ACHIEVED IN THE BED, AND MEASURE THE DEPTH OF THE REMAINING MULCH.
  - CHECK FOR SEDIMENT BUILDUP AT CURB CUTS, GRAVEL DIAPHRAGMS OR PAVEMENT EDGES THAT PREVENTS FLOW FROM GETTING INTO THE BED, AND CHECK FOR OTHER SIGNS OF BYPASSING.
  - CHECK FOR ANY WINTER- OR SALT-KILLED VEGETATION, AND REPLACE IT WITH HARDIER SPECIES.
  - NOTE PRESENCE OF ACCUMULATED SAND, SEDIMENT AND TRASH IN THE PRE-TREATMENT CELL OR FILTER BEDS, AND REMOVE IT.
  - INSPECT BIORETENTION SIDE SLOPES AND GRASS FILTER STRIPS FOR EVIDENCE OF ANY RILL OR GULLY EROSION, AND REPAIR IT.
  - CHECK THE BIORETENTION BED FOR EVIDENCE OF MULCH FLOTATION, EXCESSIVE PONDING, DEAD PLANTS OR CONCENTRATED FLOWS, AND TAKE APPROPRIATE REMEDIAL ACTION.
  - CHECK INFLOW POINTS FOR CLOGGING, AND REMOVE ANY SEDIMENT.
  - LOOK FOR ANY BARE SOIL OR SEDIMENT SOURCES IN THE CONTRIBUTING DRAINAGE AREA, AND STABILIZE THEM IMMEDIATELY.
  - CHECK FOR CLOGGED OR SLOW-DRAINING SOIL MEDIA, A CRUST FORMED ON THE TOP LAYER, INAPPROPRIATE SOIL MEDIA, OR OTHER CAUSES OF INSUFFICIENT FILTERING TIME, AND RESTORE PROPER FILTRATION CHARACTERISTICS.

EXAMPLE MAINTENANCE INSPECTION CHECKLISTS FOR BIORETENTION AREAS CAN BE ACCESSED IN APPENDIX C OF CHAPTER 9 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (2010).

ROUTINE AND NON-ROUTINE MAINTENANCE TASKS

MAINTENANCE OF BIORETENTION AREAS SHOULD BE INTEGRATED INTO ROUTINE LANDSCAPE MAINTENANCE TASKS. IF LANDSCAPING CONTRACTORS WILL BE EXPECTED TO PERFORM MAINTENANCE, THEIR CONTRACTS SHOULD CONTAIN SPECIFICS ON UNIQUE BIORETENTION LANDSCAPING NEEDS, SUCH AS MAINTAINING ELEVATION DIFFERENCES NEEDED FOR PONDING, PROPER MULCHING, SEDIMENT AND TRASH REMOVAL, AND LIMITED USE OF FERTILIZERS AND PESTICIDES. A CUSTOMIZED MAINTENANCE SCHEDULE MUST BE PREPARED FOR EACH BIORETENTION FACILITY, SINCE THE MAINTENANCE TASKS WILL DIFFER DEPENDING ON THE SCALE OF BIORETENTION, THE LANDSCAPING TEMPLATE CHOSEN, AND THE TYPE OF SURFACE COVER. A GENERALIZED SUMMARY OF COMMON MAINTENANCE TASKS AND THEIR FREQUENCY IS PROVIDED IN THE TABLE BELOW.

THE MOST COMMON NON-ROUTINE MAINTENANCE PROBLEM INVOLVES STANDING WATER. IF WATER REMAINS ON THE SURFACE FOR MORE THAN 48 HOURS AFTER A STORM, ADJUSTMENTS TO THE GRADING MAY BE NEEDED OR UNDERDRAIN REPAIRS MAY BE NEEDED. THE SURFACE OF THE FILTER BED SHOULD ALSO BE CHECKED FOR ACCUMULATED SEDIMENT OR A FINE CRUST THAT BUILDS UP AFTER THE FIRST SEVERAL STORM EVENTS. THERE ARE SEVERAL METHODS THAT CAN BE USED TO REHABILITATE THE FILTER (TRY THE EASIEST THINGS FIRST, AS LISTED BELOW):

- OPEN THE UNDERDRAIN OBSERVATION WELL OR CLEANOUT AND POUR IN WATER TO VERIFY THAT THE UNDERDRAINS ARE FUNCTIONING AND NOT CLOGGED OR OTHERWISE IN NEED OF REPAIR. THE PURPOSE OF THIS CHECK IS TO SEE IF THERE IS STANDING WATER ALL THE WAY DOWN THROUGH THE SOIL. IF THERE IS STANDING WATER ON TOP, BUT NOT IN THE UNDERDRAIN, THEN THERE IS A CLOGGED SOIL LAYER. IF THE UNDERDRAIN AND STAND PIPE INDICATES STANDING WATER, THEN THE UNDERDRAIN MUST BE CLOGGED AND WILL NEED TO BE SNAKED.
- REMOVE ACCUMULATED SEDIMENT AND TILL 2 TO 3 INCHES OF SAND INTO THE UPPER 8 TO 12 INCHES OF SOIL.
- INSTALL SAND WICKS FROM 3 INCHES BELOW THE SURFACE TO THE UNDERDRAIN LAYER. SAND WICKS CAN BE INSTALLED BY EXCAVATING OR AUGERING (USING A TREE AUGER OR SIMILAR TOOL) DOWN TO THE GRAVEL STORAGE ZONE TO CREATE VERTICAL COLUMNS WHICH ARE THEN FILLED WITH A CLEAN OPEN-GRADED COARSE SAND MATERIAL (COARSE SAND MIX SIMILAR TO THE GRADATION USED FOR THE SOIL MEDIA). A SUFFICIENT NUMBER OF WICK DRAINS OF SUFFICIENT DIMENSION SHOULD BE INSTALLED TO MEET THE DESIGN DEWATERING TIME FOR THE FACILITY.
- LAST RESORT - REMOVE AND REPLACE SOME OR ALL OF THE SOIL MEDIA.

ANNUAL BIORETENTION MAINTENANCE ACTIVITIES

Maintenance Tasks	Frequency
<ul style="list-style-type: none"><li>Mowing of grass filter strips and bioretention turf cover</li></ul>	At least 4 times a year
<ul style="list-style-type: none"><li>Spot weeding, erosion repair, trash removal, and mulch raking</li></ul>	Twice during growing season
<ul style="list-style-type: none"><li>Add reinforcement planting to maintain desired the vegetation density</li></ul>	As needed
<ul style="list-style-type: none"><li>Remove invasive plants using recommended control methods</li><li>Stabilize the contributing drainage area to prevent erosion</li></ul>	
<ul style="list-style-type: none"><li>Spring inspection and cleanup</li><li>Supplement mulch to maintain a 3 inch layer</li><li>Prune trees and shrubs</li></ul>	Annually
<ul style="list-style-type: none"><li>Remove sediment in pre-treatment cells and inflow points</li></ul>	Once every 2 to 3 years
<ul style="list-style-type: none"><li>Replace the mulch layer</li></ul>	Every 3 years

SOURCE: VIRGINIA STORMWATER BMP CLEARINGHOUSE SPECIFICATION NO. 9 (BIORETENTION)

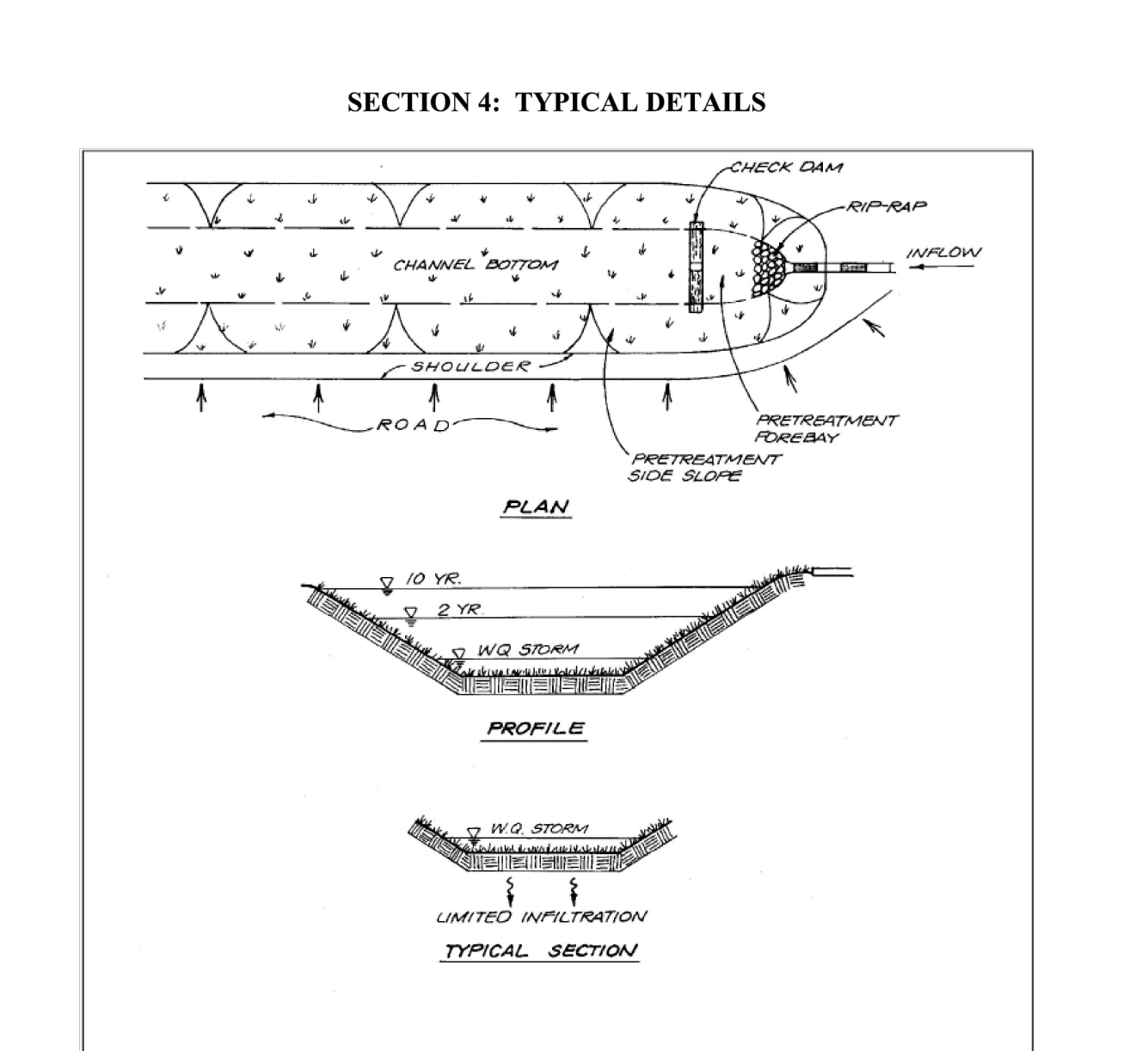
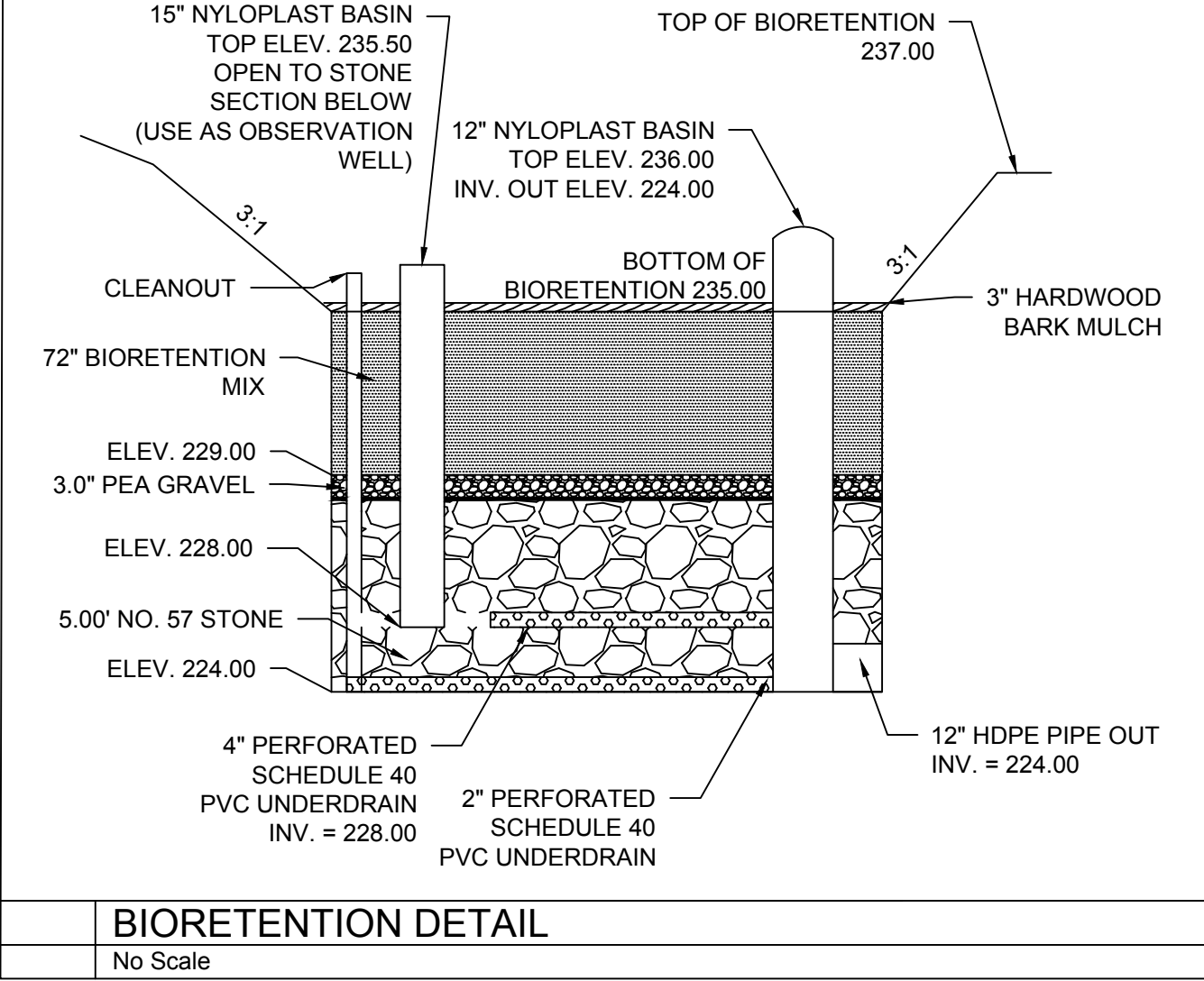


Figure 3.1. Grass Channel – Typical Plan, Profile and Section

5.1 Physical Feasibility

BioRETENTION can be applied in most soils or topography, since runoff simply percolates through an engineered soil bed and is returned to the stormwater system. Key constraints with bioRETENTION include the following:

**Available Space.** Planners and designers can assess the feasibility of using bioRETENTION facilities based on a simple relationship between the contributing drainage area and the corresponding required surface area. The bioRETENTION surface area will be approximately 3% to 6% of the contributing drainage area, depending on the imperviousness of the CDA and the desired bioRETENTION design level.

**Site Topography.** BioRETENTION is best applied when the grade of contributing slopes is greater than 1% and less than 5%.

COMMONWEALTH OF VIRGINIA

JOHN FRANCIS P. GASTON

Lic. No. 35787

09/11/15

PROFESSIONAL ENGINEER

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REVISION DESCRIPTION

35% SUBMISSION

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07/16/15

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DATE

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BMP DETAILS & SPECIFICATIONS

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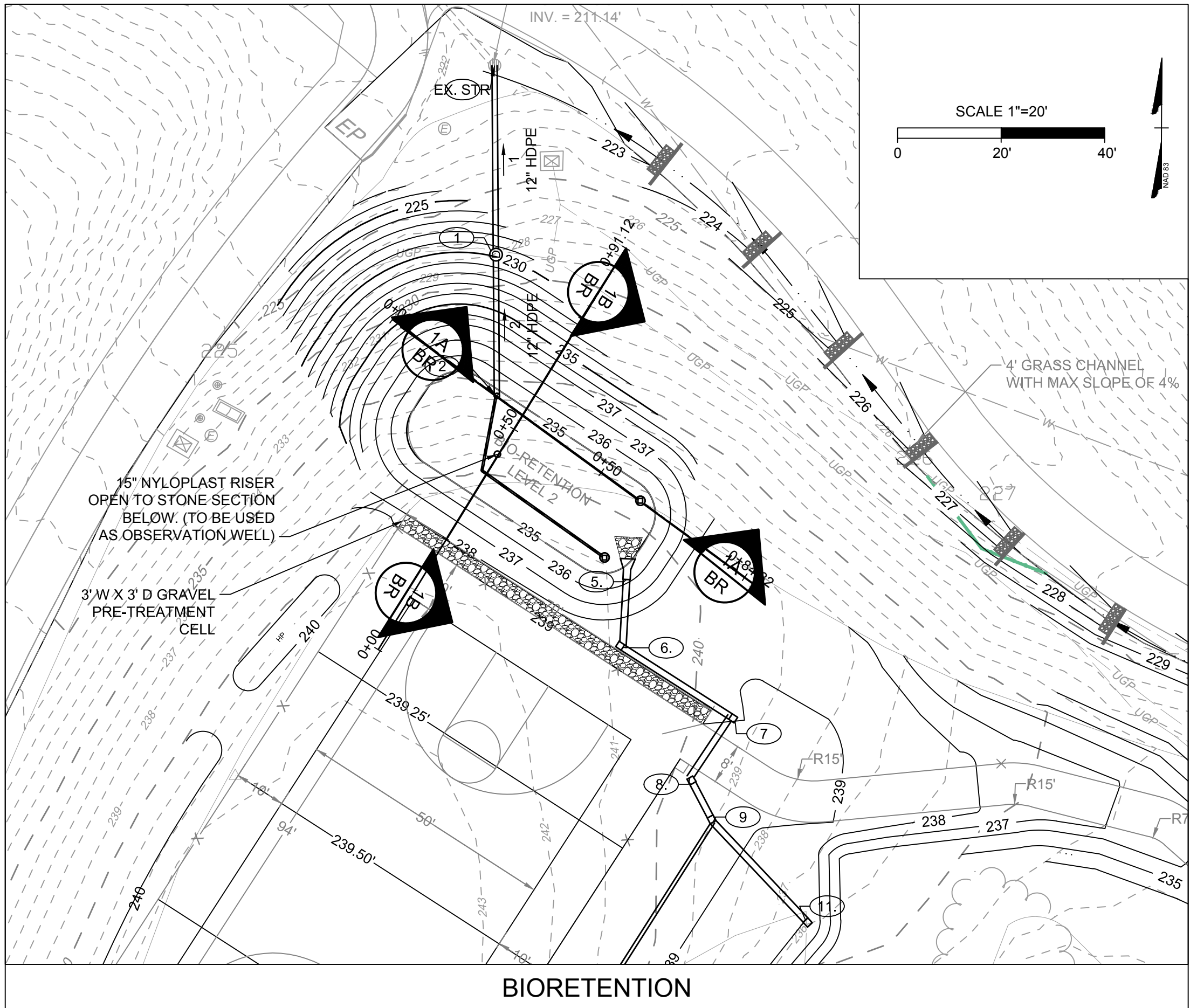
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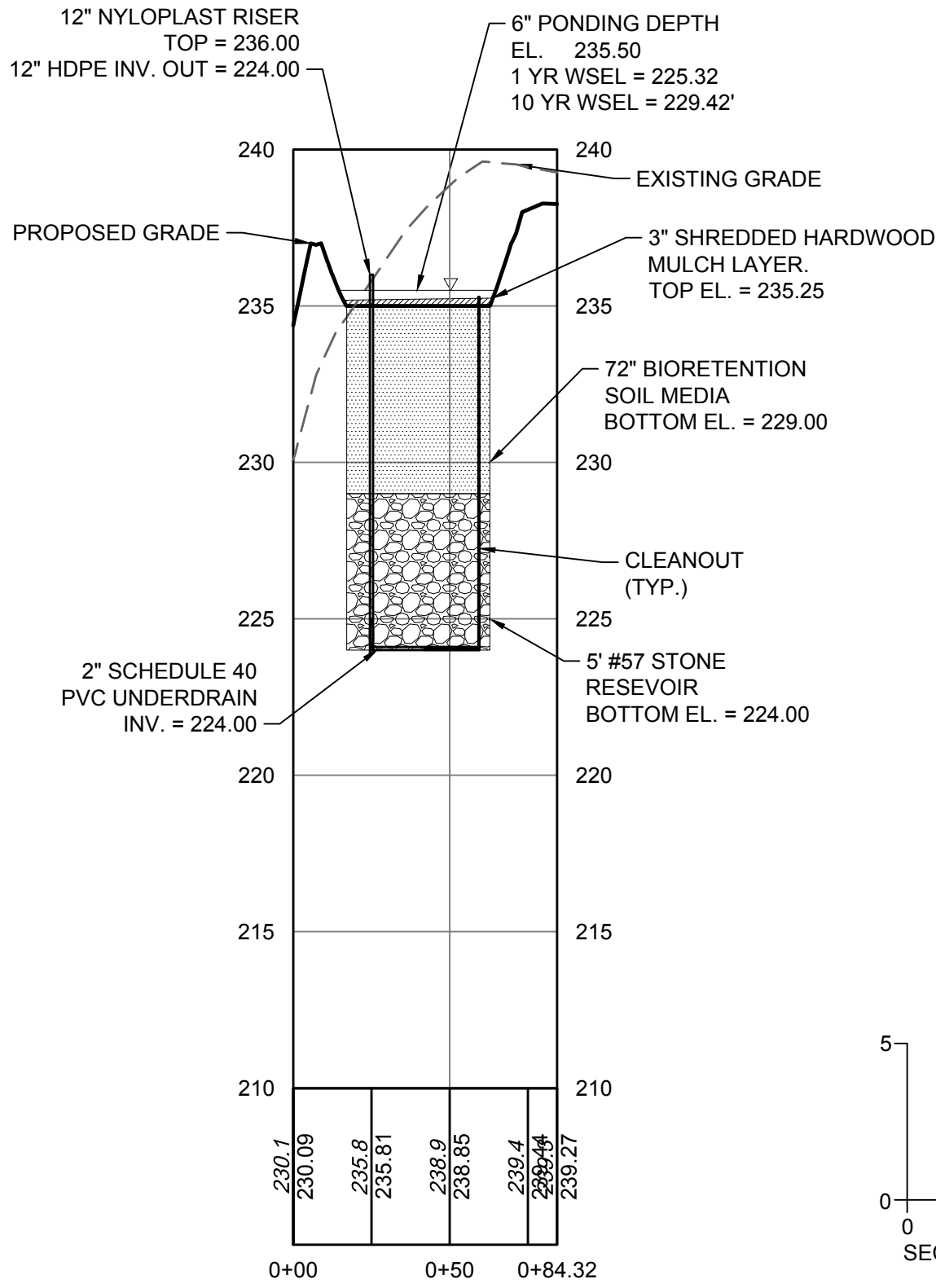




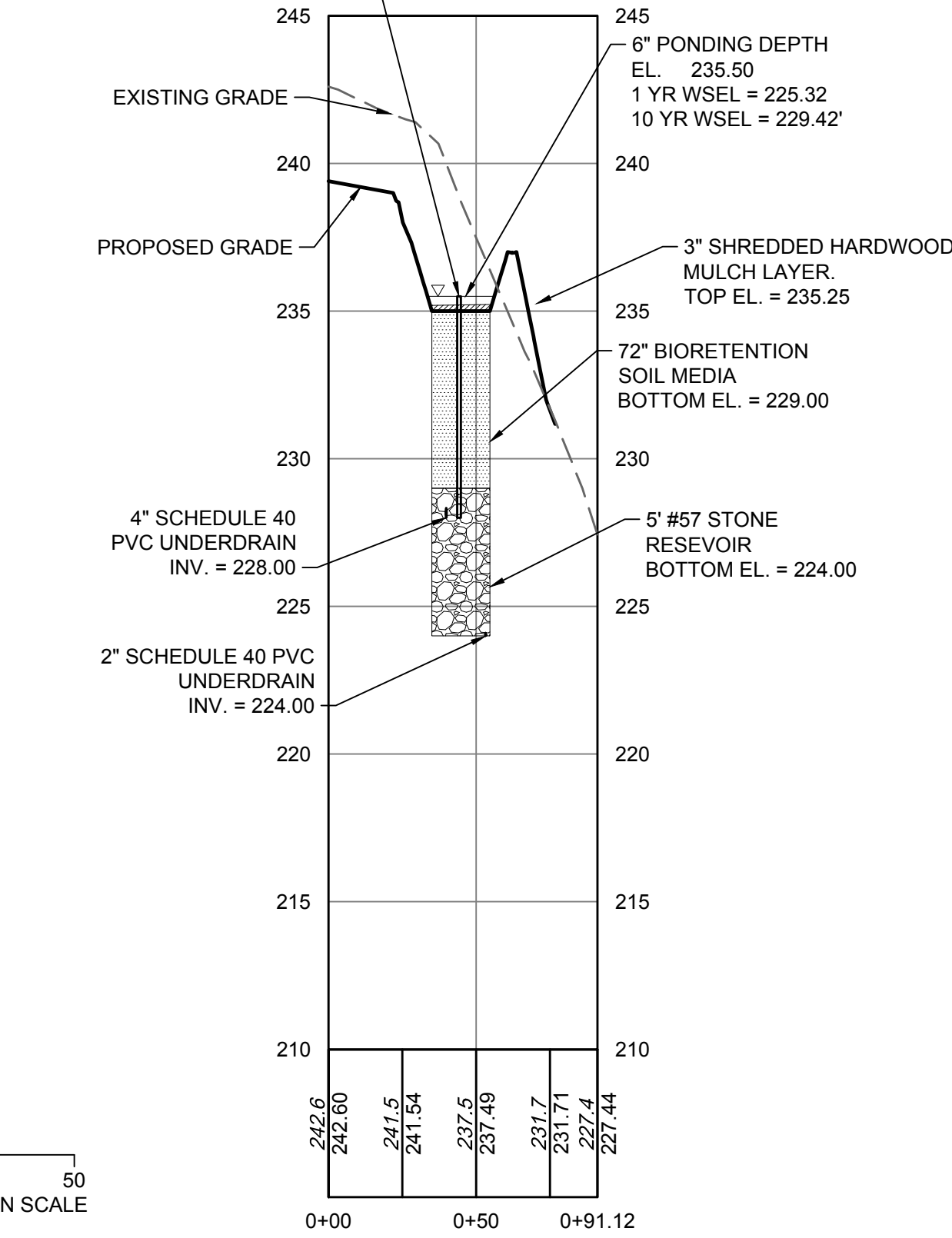
STONE STORAGE PRE-TREATMENT CELL					
Elev.	SA	Void Ratio	Volume	Cum. Volume	
ft	SF		CF	CF	
236	210	0	0	0	
237	210	0.4	84	84	
238	210	0.4	84	168	
239	210	0.4	84	252	

GRAVEL PRE-TREATMENT CELL:  
TV (BIO-RET) = 1159 CF  
MIN. 15% TV = 174 CF  
PROVIDED = 252 CF

CROSS SECTION 1A



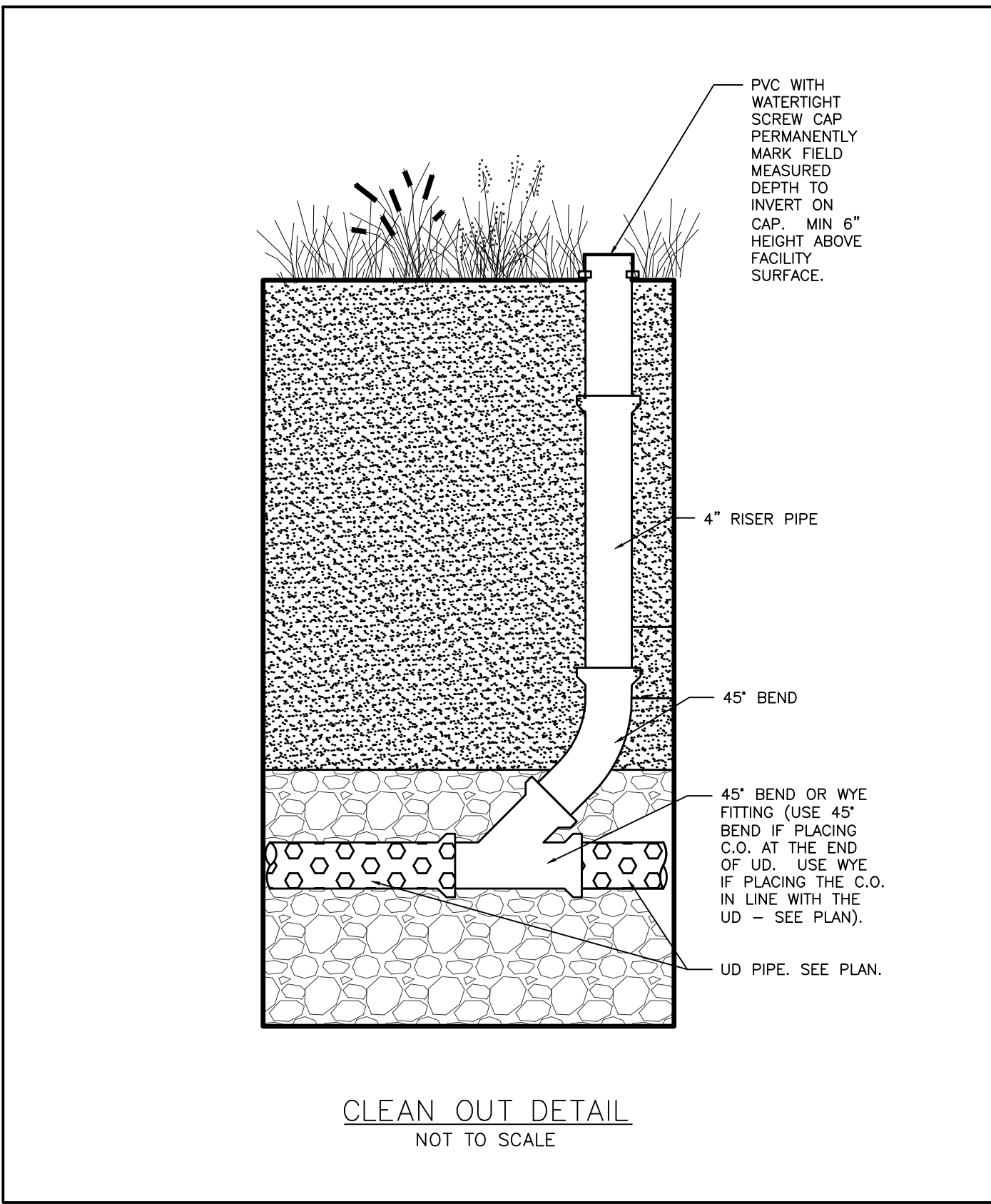
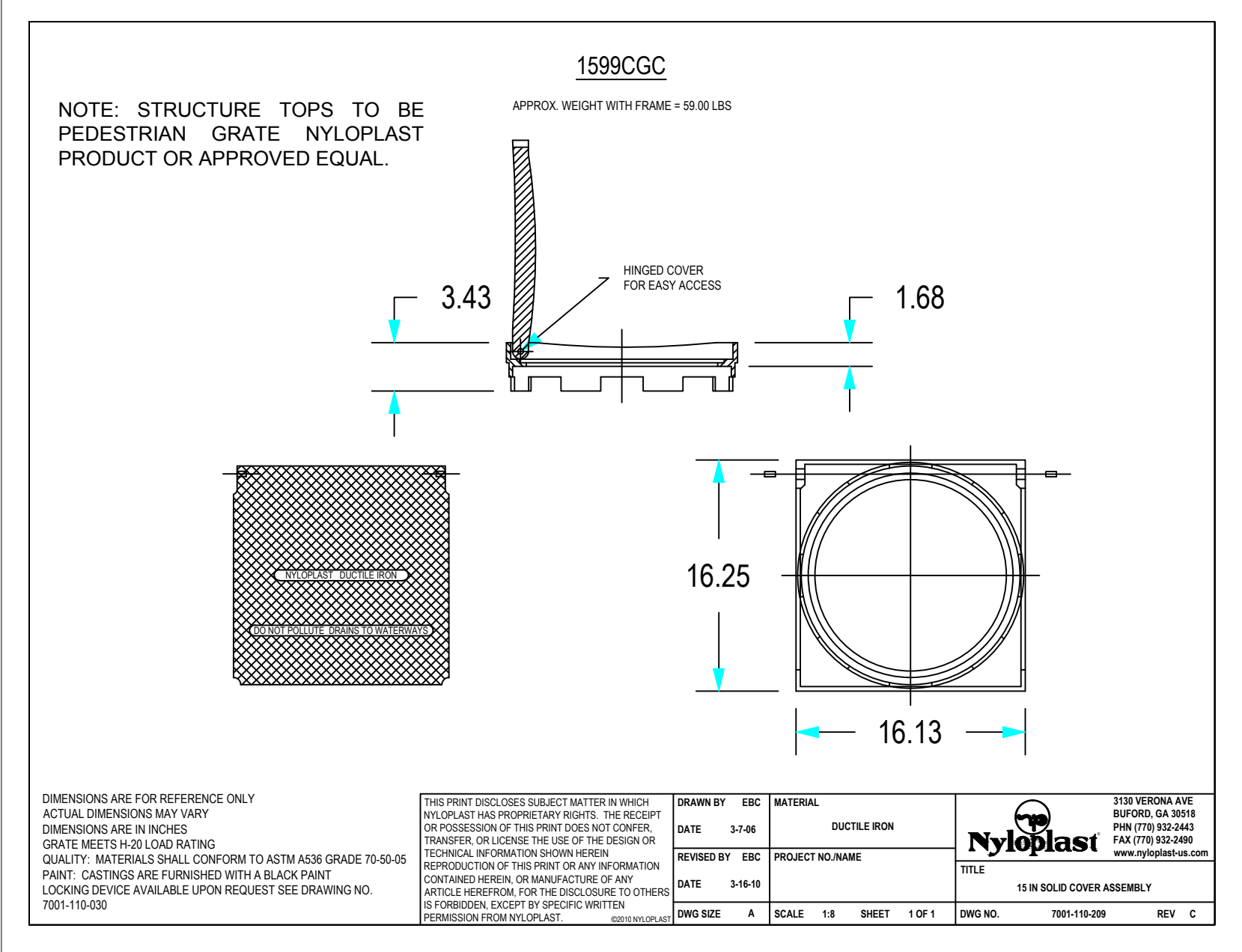
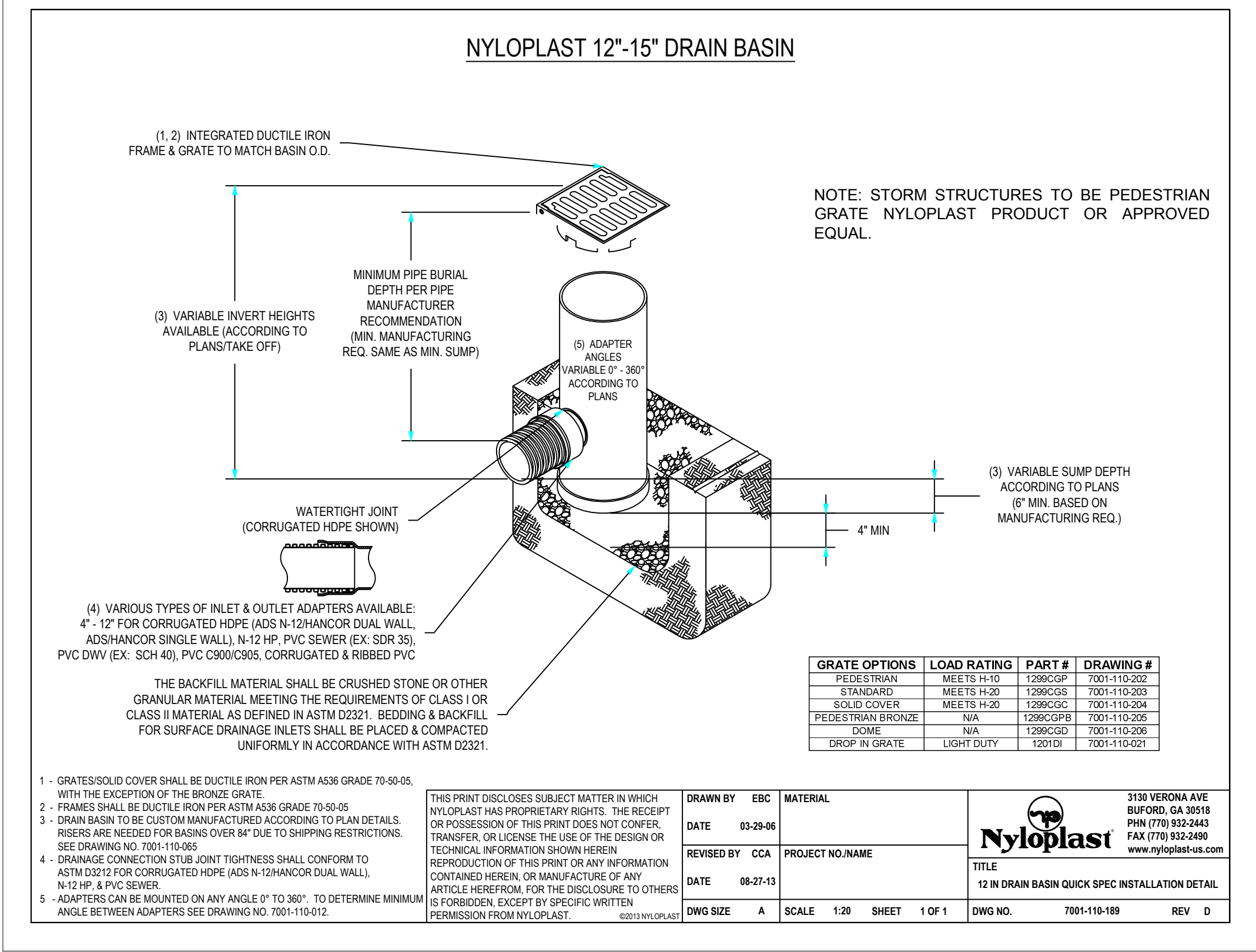
CROSS SECTION 1B



LEVEL 2 BIO-RETENTION STORAGE DESIGN			
Drainage Area A From VRRM Spreadsheet			
Post Development Treatment Volume (cf)		1159	

Bioretention Surface Area Sizing		Media Type	Max Media Depth (ft)** (Vr) - Void Ratio*	
Surface Area (ft <sup>2</sup> )	603.6458	BR Soil Media	6.00	0.25
Surface Area (ft <sup>2</sup> ) PROVIDED	960	Gravel	1	0.40
		Surface Storage***	0.5	1.00
		Storage Depth	2.4	

NOTE: BIO-RETENTION GRAVEL SECTION SHOWN IN LEVEL 2 BIO-RETENTION STORAGE DESIGN TABLE ABOVE WAS USED TO FIND THE SURFACE AREA OF THE BIO-RETENTION REQUIRED. THE TOTAL STONE SECTION IS 5' AS SHOWN IN THE CROSS SECTIONS ABOVE.



COMMONWEALTH OF VIRGINIA

JOHN FRANCIS P. GASTON

Lic. No. 35787

PROFESSIONAL ENGINEER

09/11/15

THIS DRAWING PREPARED AT THE

NORTHERN VIRGINIA OFFICE

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REVISION DESCRIPTION

35% SUBMISSION

RESPONSE TO COMMENTS/ 95% SUBMISSION

RESPONSE TO NGA COMMENTS FROM MEETING ON 7-2-15

RESPONSE TO COMMENTS ON 100% SUBMISSION

DATE

04/29/15

06/23/15

07/16/15

09/11/15

DATE

6/23/15

DRAWN BY

KG

DESIGNED BY

KG

CHECKED BY

JG

SCALE

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NCE RECREATIONAL FACILITY

FT BELVOIR, VA

BMP PROFILES AND DETAILS

JOB NO.

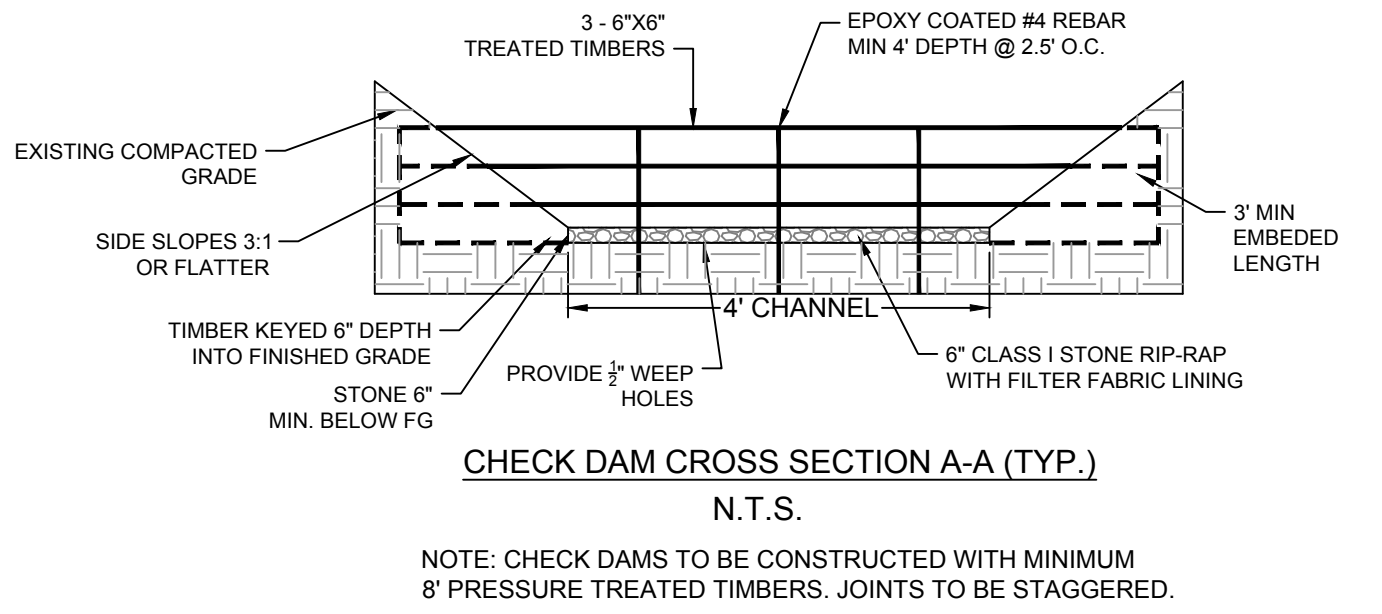
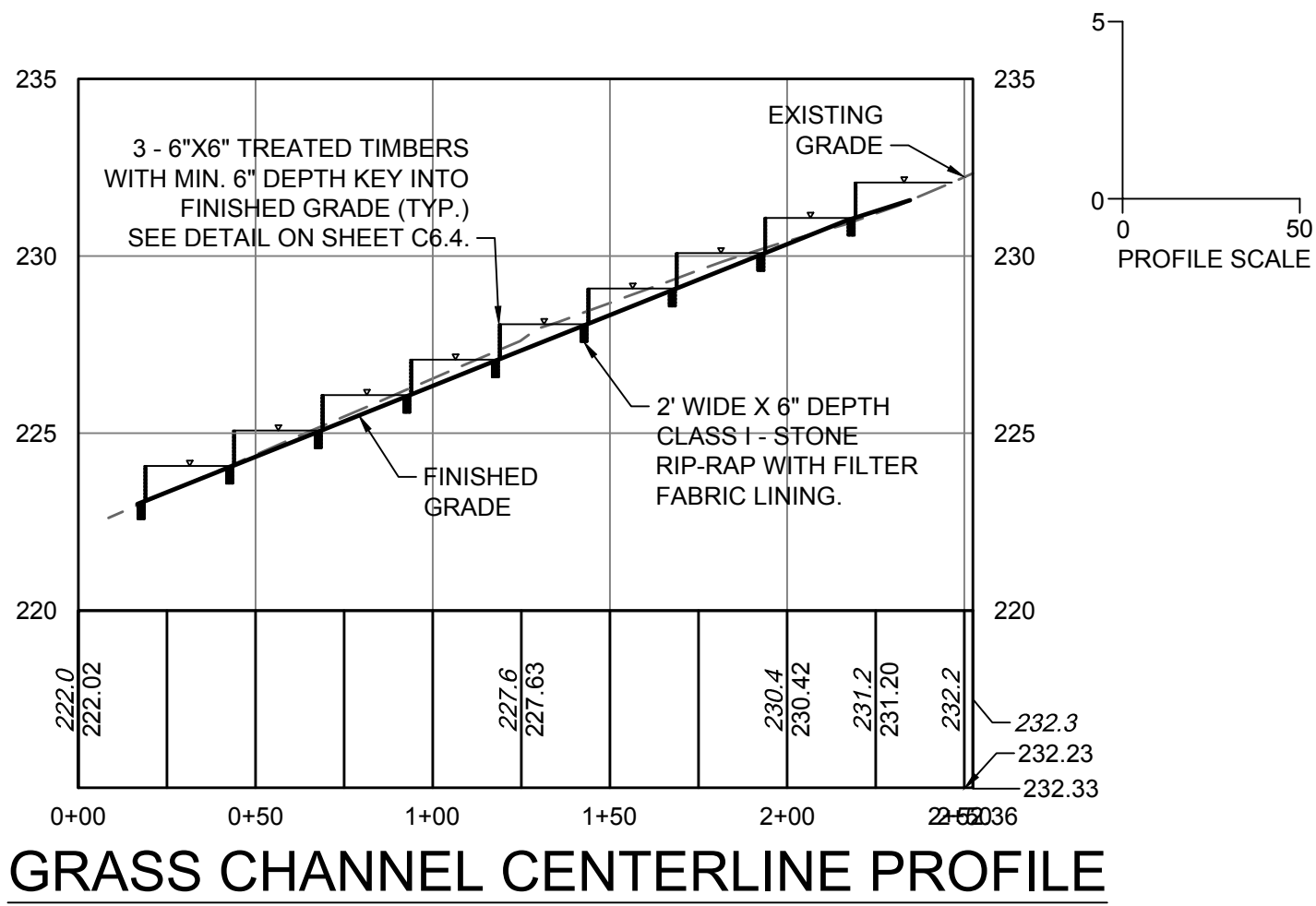
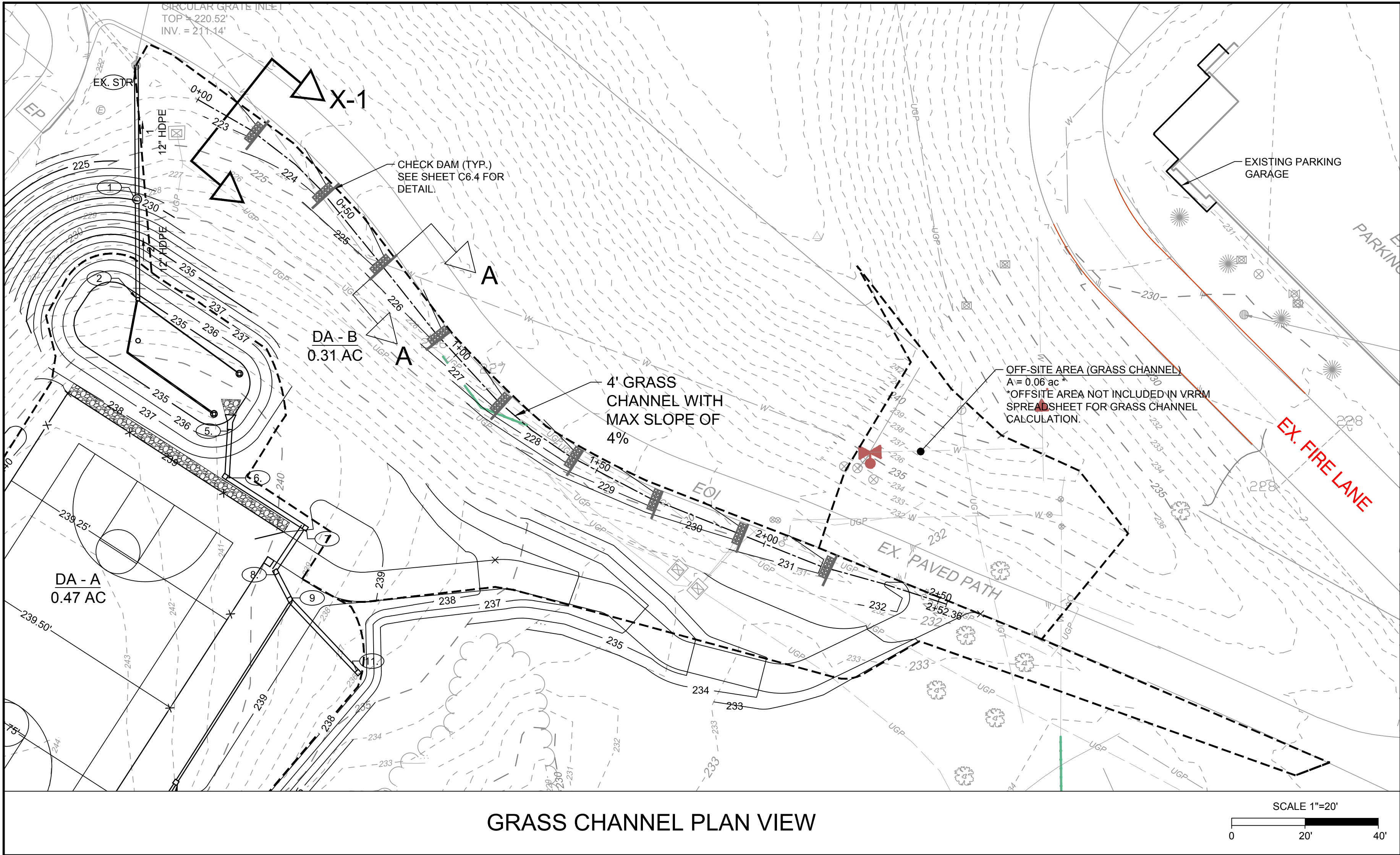
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Worksheet for Grass Channel X-1 (1 Year)		
Project Description		
Friction Method	Manning Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.035	
Channel Slope	0.04000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	0.57	ft³/s
Results		
Normal Depth	0.08	ft
Flow Area	0.36	ft²
Wetted Perimeter	4.54	ft
Hydraulic Radius	0.08	ft
Top Width	4.51	ft
Critical Depth	0.08	ft
Critical Slope	0.04185	ft/ft
Velocity	1.58	ft/s
Velocity Head	0.04	ft
Specific Energy	0.12	ft
Froude Number	0.98	
Flow Type	Subcritical	
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.08	ft
Critical Depth	0.08	ft
Channel Slope	0.04000	ft/ft

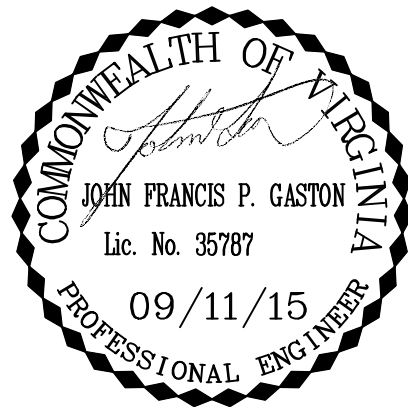
Bentley Systems, Inc. Haestad Methods ~~Software~~ Master V8i (SELECTseries 1) 08.11.01.03

9/10/2015 11:13:43 AM27 Siemens Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666Page1 of 0

Worksheet for Grass Channel X-1 (2 Year)		
Project Description		
Friction Method	Manning Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.035	
Channel Slope	0.04000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	0.69	ft³/s
Results		
Normal Depth	0.10	ft
Flow Area	0.41	ft²
Wetted Perimeter	4.60	ft
Hydraulic Radius	0.09	ft
Top Width	4.57	ft
Critical Depth	0.09	ft
Critical Slope	0.04035	ft/ft
Velocity	1.69	ft/s
Velocity Head	0.04	ft
Specific Energy	0.14	ft
Froude Number	1.00	
Flow Type	Subcritical	
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.10	ft
Critical Depth	0.09	ft
Channel Slope	0.04000	ft/ft
Bentley Systems, Inc. Haestad Methods <del>Software</del> Master VS (SELECTseries 1) [08.11.01.03]		
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Worksheet for Grass Channel X-1 (10 Year)		
Project Description		
Friction Method	Manning Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.035	
Channel Slope	0.04000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	0.91	ft³/s
Results		
Normal Depth	0.11	ft
Flow Area	0.49	ft²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.10	ft
Top Width	4.67	ft
Critical Depth	0.11	ft
Critical Slope	0.03816	ft/ft
Velocity	1.87	ft/s
Velocity Head	0.05	ft
Specific Energy	0.17	ft
Froude Number	1.02	
Flow Type	Supercritical	
GVF Input Data		
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.11	ft
Critical Depth	0.11	ft
Channel Slope	0.04000	ft/ft
Bentley Systems, Inc. Haestad Methods <del>Software</del> <b>FlowMaster</b> V8i (SELECTseries 1) [08.11.01.03]		
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- NOTES:
1. FLOW TO GRASS CHANNEL BASED OFF OF ENTIRE DRAINAGE AREA OF 0.37 ACRES AND A WEIGHTED C-VALUE OF 0.36. THE 1 YEAR VELOCITY EXCEEDS 1 FPS THEREFORE CHECK DAMS ARE PROVIDED.
  2. RAINFALL INTENSITY VALUES BASED OFF OF NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY. THE 1 YEAR, 2 YEAR AND 10 YEAR INTENSITY VALUES ARE 4.30, 5.15, AND 6.84 INCHES PER HOUR.



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BMP PROFILES AND DETAILS

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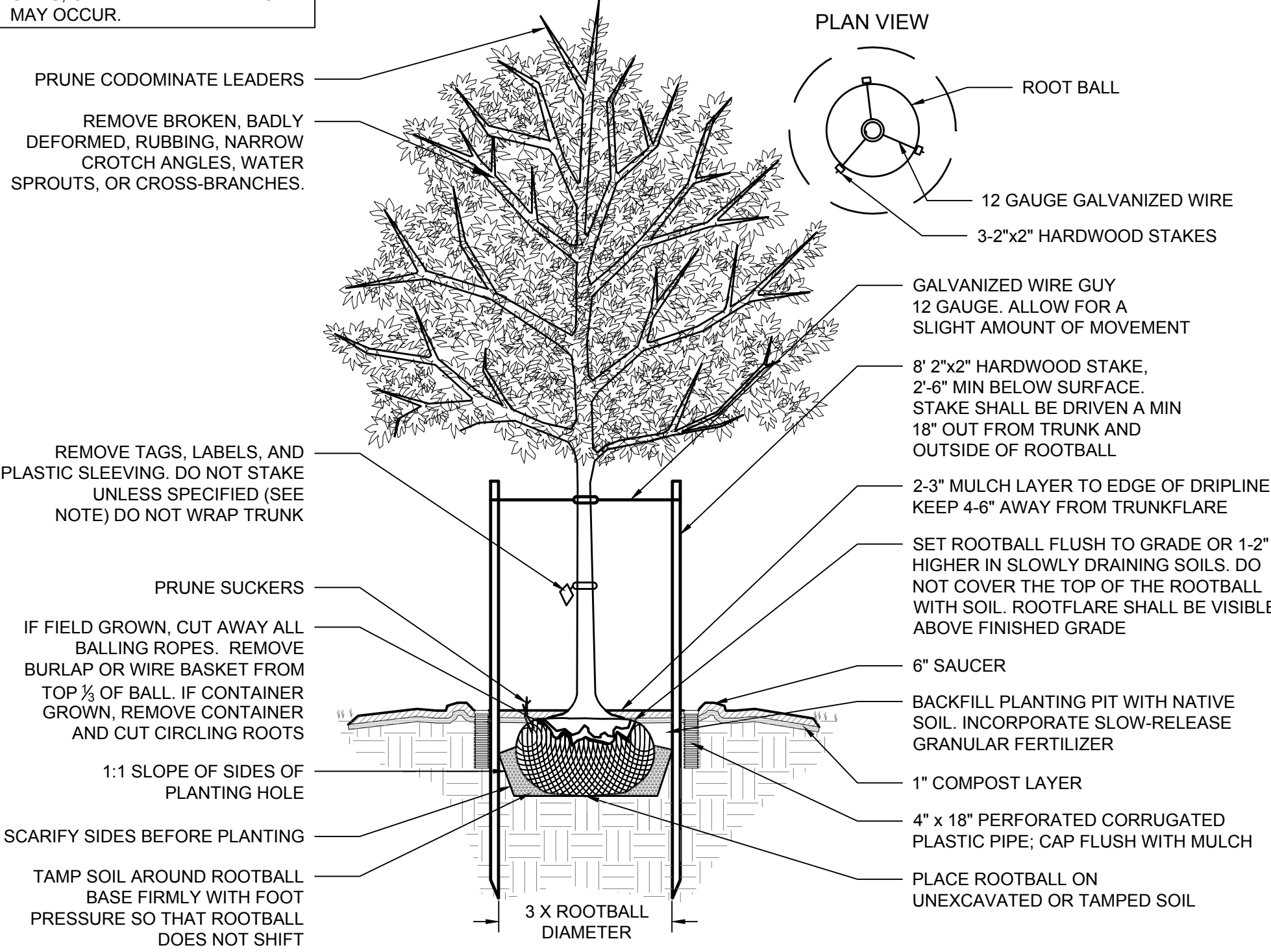
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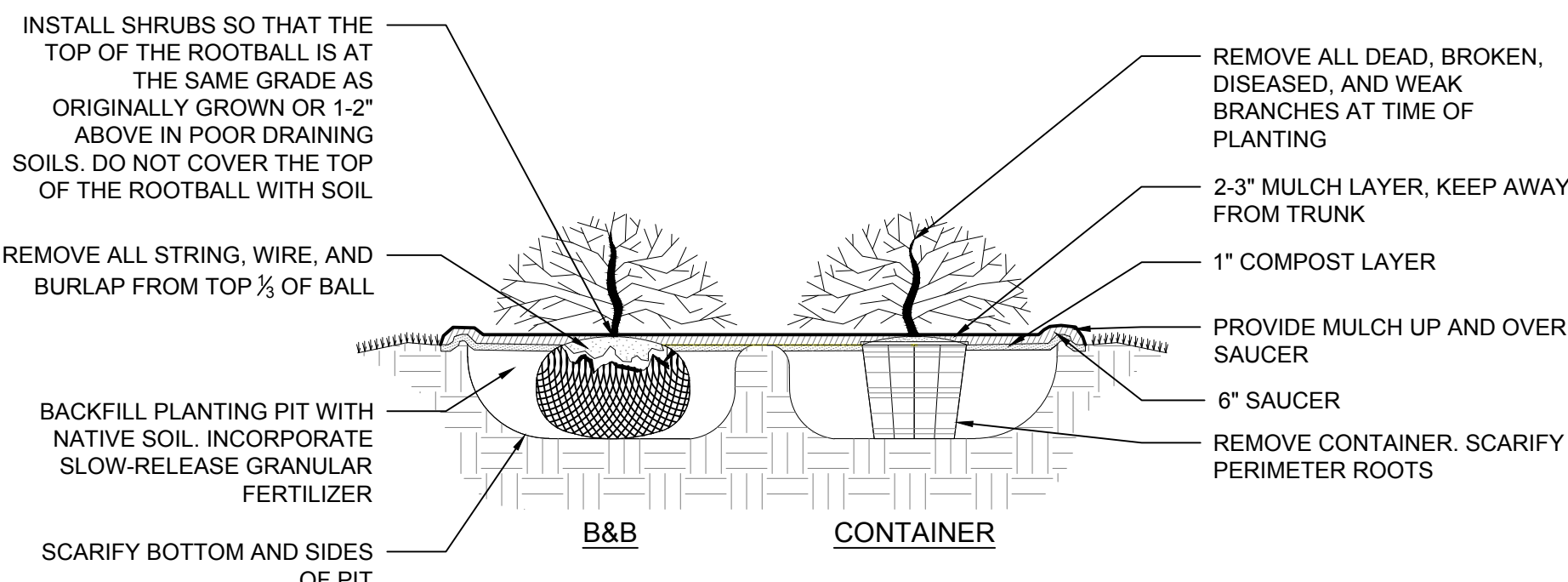




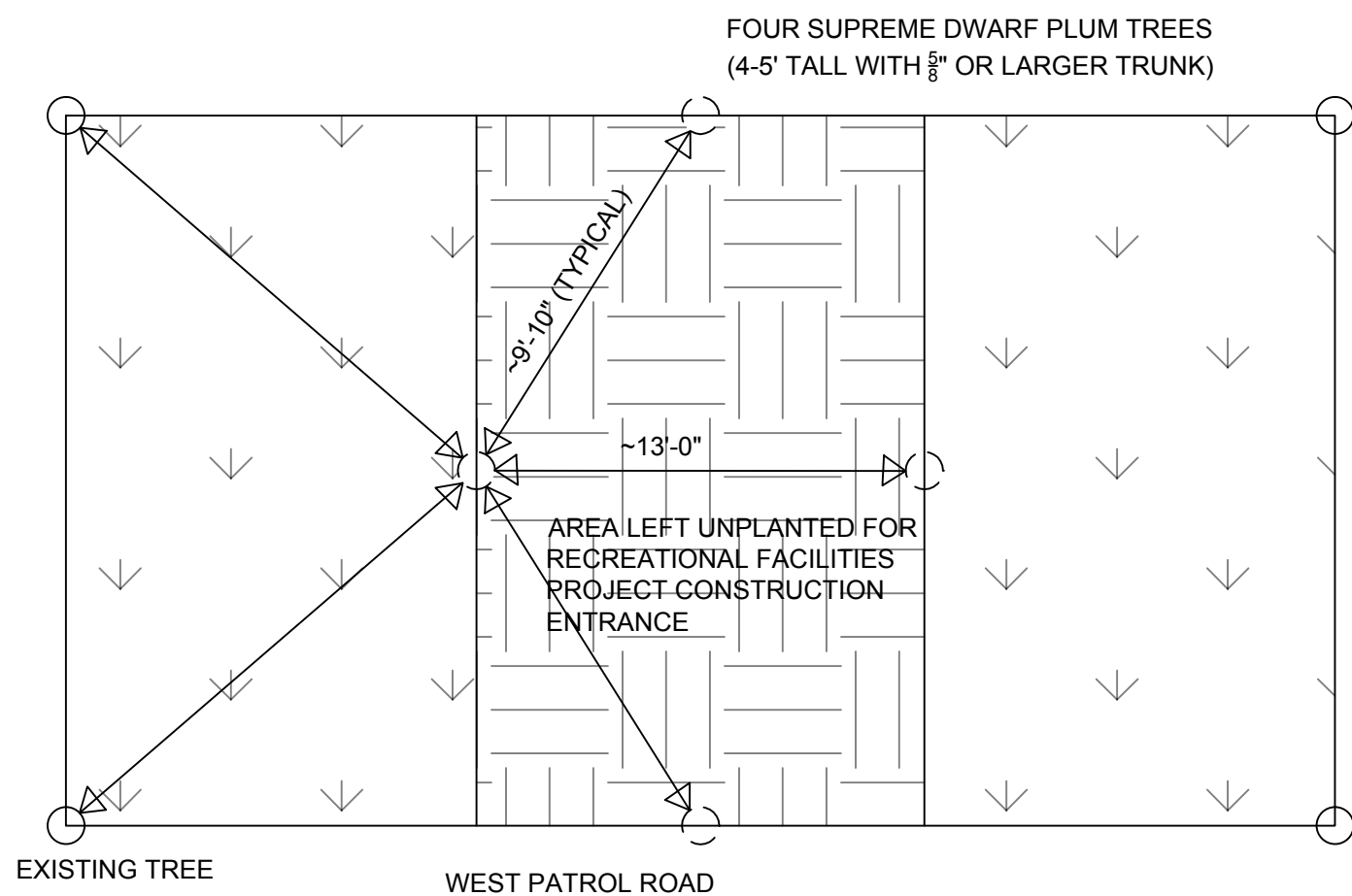
NOTE: ONLY STAKE TREES WITH LARGE CROWNS, 2" CALIPER OR GREATER, IF LOCATED ON WINDY SITES, OR WHERE TAMPERING MAY OCCUR.



# 1 DECIDUOUS TREE - STAKING SPECIFIED NOT TO SCALE



# 4 SHRUB PLANTING NOT TO SCALE



## GENERAL LANDSCAPE NOTES

- PLANTS SHALL CONFORM TO CURRENT "AMERICAN STANDARDS FOR NURSERY STOCK" BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION (ANLA), PARTICULARLY WITH REGARDS TO SITE, GROWTH, AND SIZE OF BALL AND DENSITY OF BRANCH STRUCTURE. CONTRACTOR TO INSURE ALL PLANT MATERIAL CONFORM TO NATIONAL AND LOCAL BUILDING CODES AND ORDINANCES.
- ALL PLANTS (B&B OR CONTAINER) SHALL BE PROPERLY IDENTIFIED BY WEATHERPROOF LABELS SECURELY ATTACHED HERETO BEFORE DELIVERY TO PROJECT SITE. LABELS SHALL IDENTIFY PLANTS BY NAME, SPECIES AND SIZE. LABELS SHALL NOT BE REMOVED UNTIL THE FINAL INSPECTION BY THE OWNER'S REPRESENTATIVE.
- ANY MATERIAL AND/OR WORK MAY BE REJECTED BY THE OWNER'S REPRESENTATIVE IF IT DOES NOT MEET THE REQUIREMENTS OF THE SPECIFICATIONS. THE CONTRACTOR SHALL REMOVE ALL REJECTED MATERIALS FROM THE SITE.
- THE CONTRACTOR SHALL FURNISH ALL PLANTS IN QUANTITIES AND SIZES TO COMPLETE THE WORK AS SPECIFIED IN PLANT SCHEDULE. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ALL PLANT QUANTITIES ON THE PLANS PRIOR TO COMMENCEMENT OF WORK. QUANTITIES IN THE PLANT SCHEDULE ARE FOR THE CONTRACTORS CONVENIENCE ONLY AND DO NOT CONSTITUTE THE FINAL COUNT.
- SUBSTITUTIONS IN PLANT SPECIES OR SIZE SHALL BE IN ACCORDANCE WITH SECTION 800 OF THE PRINCE WILLIAM COUNTY DESIGN AND CONSTRUCTION MANUAL (DCSM) AND THE VIRGINIA DEQ/DCR STORMWATER DESIGN SPECIFICATION NO. 9, THE ANLA AND WITH THE WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
- PLANTS SHALL BE LOCATED AS SHOWN ON THE DRAWINGS AND BY SCALING OR AS DESIGNATED IN THE FIELD BY THE OWNER'S REPRESENTATIVE. ALL LOCATIONS ARE TO BE APPROVED BY THE OWNER'S REPRESENTATIVE BEFORE EXCAVATION.
- CONTRACTOR SHALL LOCATE AND MARK ALL UNDERGROUND UTILITY LINES AND IRRIGATION SYSTEMS PRIOR TO EXCAVATING PLANT BEDS OR PITS. ALL UTILITY EASEMENT AREAS WHERE NO PLANTING SHALL TAKE PLACE SHALL ALSO BE MARKED ON THE SITE, PRIOR TO LOCATING AND DIGGING THE TREE PITS. IF UTILITY LINES ARE ENCOUNTERED IN EXCAVATION OF TREE PITS, OTHER LOCATIONS FOR THE TREES SHALL BE SELECTED BY THE OWNER'S REPRESENTATIVE. SUCH CHANGES SHALL BE MADE BY THE CONTRACTOR WITHOUT ADDITIONAL COMPENSATION. NO CHANGES OF LOCATION SHALL BE MADE WITHOUT THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
- ALL EQUIPMENT AND TOOLS SHALL BE PLACED SO AS NOT TO INTERFERE OR HINDER THE PEDESTRIAN AND VEHICULAR TRAFFIC FLOW.
- DURING PLANTING OPERATIONS, EXCESS AND WASTE MATERIALS SHALL BE PROMPTLY AND FREQUENTLY REMOVED FROM THE SITE.
- ALL SHRUB PITS ARE TO BE EXCAVATED TO A MINIMUM DEPTH TO ALLOW THE SHRUB ROOT BALL TO BE A MINIMUM OF 4" HIGHER THAN FINISH GRADE. ALL PLANT SHRUB BEDS ARE TO BE EXCAVATED TO THE WIDTH SHOWN ON THE PLANS.
- ALL TREE PITS ARE TO BE EXCAVATED TO A MINIMUM DEPTH TO ALLOW THE TREE ROOT BALL TO BE A MINIMUM OF 2-3" HIGHER THAN FINISH GRADE. THE TREE ROOT BALL IS TO REST ON UNDISTURBED SOIL, OR A COMPACTED BED MUST BE PREPARED FOR THE TREE ROOT BALL TO REST ON AND WHICH WILL NOT SUBSIDE CAUSING THE TREE TO SINK BELOW FINISH GRADE. ALL TREE PITS ARE TO BE A MINIMUM OF 12" LARGER ON EVERY SIDE OF THE TREES ROOT BALL.
- THE PLANTER BEDS ARE TO BE ENTIRELY CLEANED OUT TO THE UNDISTURBED SOIL LEVEL. ALL EXISTING SOIL, CONSTRUCTION DEBRIS, ROOTS AND OTHER FOREIGN MATERIAL ARE TO BE REMOVED AND DISCARDED OFFSITE.
- THE TOPSOIL TO BE USED TO FILL THE TREE PITS, SHRUB BEDS AND PLANTERS IS TO BE PLANT SPECIFIC. THE TOPSOIL FOR THE TREES, SHRUBS AND PLANTER SHALL CONSIST OF A MAXIMUM 2/3 EXISTING TOPSOIL FROM THE SITE, WHICH IS CLEANED AND FREE OF CLAY, A MINIMUM OF 1/3 PEAT MOSS, OR OTHER APPROVED ORGANIC MATERIAL OR IMPORTED NEW LOAMY TOPSOIL AND 10% COW MANURE. ALL OF THESE MATERIALS ARE TO BE MIXED PRIOR TO PLACING IN THE PLANTER OR BACKFILLING WHEN PLANTING.
- THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ALL PLANT PITS ARE WELL DRAINED. THE LANDSCAPE CONTRACTOR WITHOUT COST TO THE OWNER WILL REPLACE ALL PLANT MATERIAL, WHICH IS AFFECTED BY POOR DRAINAGE.
- ALL LAWN AREAS ARE TO BE TILLED TO A DEPTH OF 6" AND ALL FOREIGN MATERIAL REMOVED WHICH WILL INHIBIT THE HEALTHY GROWTH OF THE GRASS. ALL OLD GRASS AND GRASS ROOTS ARE TO BE REMOVED FROM THE SITE. NEW TOPSOIL OF A MINIMUM 4" IS TO BE PLACED OVER THE AREAS TO BE SODDED. THE GRASS AREAS ARE TO BE FINE GRADED TO ENSURE THAT NO UNDULATIONS OCCUR. THE LAWN TOPSOIL IS TO BE ROLLED AND LIGHTLY IRRIGATED PRIOR TO PLACING OF THE SEED. THE SEED IS NOT TO BE LAID ON FROZEN OR SOAKED SOIL.
- THE TREES AND SHRUBS ARE TO BE HANDLED WITH THE BEST CARE AND ATTENTION TO ENSURE THAT THE PLANTS ARE NOT BRUISED, BROKEN, TORN, DAMAGED IN ANY WAY WHICH WILL AFFECT THE PLANTS GENERAL APPEARANCE AND WELLBEING.
- THE TREES AND SHRUBS ARE TO BE PLANTED WITH THE ACCEPTED STANDARDS OF THE AMERICAN ASSOCIATION OF NURSEYRMENT. THE PLANTS ARE TO BE PROPERLY WATERED AND BACKILLED DURING THE PLANTING. ALL CARE MUST BE TAKEN TO ENSURE THAT THE PLANTS ARE UPRIGHT, A PLANT'S BEST SIDE IS EXPOSED TO THE POINT OF THE PLANTS GREATEST VISIBILITY.
- THE TREES MUST BE STAKED IN ACCORDANCE WITH ACCEPTABLE NURSERY PRACTICE TO ENSURE THAT THEY ARE SECURE IN THE GROUND AND WILL GROW STRAIGHT AND UNIFORM. THE TREES ARE TO BE WRAPPED IF THE CONTRACTOR DEEMS IT NECESSARY TO PROTECT THE TREES FROM SUN SCALD OR INSECT ATTACK.
- TREES SHALL BE LOCATED A MINIMUM OF 3 FEET FROM WALLS AND WALKS.

- GROUPS OF SHRUBS SHALL BE PLACED IN A CONTINUOUS MULCH BED WITH SMOOTH CONTINUOUS LINES. ALL MULCHED BED EDGES SHALL BE CURVILINEAR IN SHAPE FOLLOWING THE CONTOUR OF THE PLANT MASS. TREES LOCATED WITHIN 4 FEET OF SHRUB BEDS SHALL SHARE SAME MULCH BED.
- PLANT ALL TREES AT FOUR (4) FEET FROM THE END OF HEAD-IN PARKING SPACES TO PREVENT DAMAGE FROM CAR OVERHANGS.
- DIG THE TREE PIT AT LEAST ONE (1) FOOT WIDE R THAN THE ROOT BALL AND EQUAL TO THE BALL'S VERTICAL DIMENSION, SO THE TOP OF THE ROOT BALL WILL BE FLUSH WITH THE GROUND LEVEL.
- ESPECIALLY IN AREAS WHERE CONSTRUCTION ACTIVITY HAS COMPACTED THE SOIL, THE BOTTOM OF THE PIT SHOULD BE SCARIFIED OR LOOSENED WITH A PICKAX OR SHOVEL.
- BACKFILL FOR ENTIRE PARKING ISLANDS AND PLANTING AREAS SHOULD BE WITH THE SITE'S EXISTING SOIL. HOWEVER, IF SOIL IS HARD, COMPACTED FILL DIRT, THE SOIL IN THE ENTIRE PARKING ISLANDS AND PLANTING AREAS SHOULD BE IMPROVED WITH ORGANIC MATTER AND THE GROUND WORKED SO THAT IT CAN BE MORE EASILY PLANTED. ALL ROOTS MUST BE COMPLETELY COVERED. PLANT MATERIAL SHOULD BE THOROUGHLY WATERED AFTER INSTALLATION.
- HERBACEOUS EMBANKMENT PLANTINGS SHOULD BE LIMITED TO 10 INCHES IN HEIGHT.
- PLANTS SHALL NOT BLOCK MAINTENANCE ACCESS TO STRUCTURES WITH TREES OR SHRUBS.

## PRE-CONSTRUCTION NOTES

- CONTRACTOR IS RESPONSIBLE FOR CONTACTING "MISS UTILITY" AT 1.800.552.7001 FOR LOCATION OF ALL UTILITY LINES. TREES SHALL BE LOCATED A MINIMUM OF 5 FEET FROM SEWER/WATER CONNECTIONS. NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS.
- VERIFY ALL PLANT MATERIAL QUANTITIES ON THE PLAN PRIOR TO BIDDING. PLANT LIST TOTALS ARE FOR CONVENIENCE ONLY AND SHALL BE VERIFIED PRIOR TO BIDDING.
- PROVIDE PLANT MATERIALS OF QUANTITY, SIZE, GENUS, SPECIES, AND VARIETY INDICATED ON PLANS. ALL PLANT MATERIALS AND INSTALLATION SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK". IF SPECIFIED PLANT MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON AVAILABILITY TO THE OWNERS REPRESENTATIVE, TOGETHER WITH PROPOSAL FOR USE OF EQUIVALENT MATERIAL.
- PROVIDE AND INSTALL ALL PLANTS AS IN ACCORDANCE WITH DETAILS AND CONTRACT SPECIFICATIONS

## CONSTRUCTION/INSTALLATION

- OWNERS REPRESENTATIVE RESERVES THE RIGHT TO REJECT ANY PLANTS AND MATERIALS THAT ARE IN AN UNHEALTHY OR UNSIGHTLY CONDITION, AS WELL AS PLANTS AND MATERIALS THAT DO NOT CONFORM TO ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK"
- CONTRACTOR IS RESPONSIBLE FOR WATERING ALL PLANT MATERIAL DURING INSTALLATION AND UNTIL FINAL INSPECTION AND ACCEPTANCE BY OWNER. CONTRACTOR SHALL NOTIFY OWNER OF CONDITIONS WHICH AFFECTS THE GUARANTEE.
- MULCH SHOULD BE PLACED TO A UNIFORM THICKNESS OF 2" TO 3". SHREDDED HARDWOOD MULCH IS THE ONLY ACCEPTED MULCH. PINE MULCH AND WOOD CHIPS WILL FLOAT AND MOVE TO THE PERIMETER OF THE BIORETENTION AREA DURING A STORM EVENT AND ARE NOT ACCEPTABLE. SHREDDED MULCH MUST BE WELL AGED (6 TO 12 MONTHS) FOR ACCEPTANCE.
- TREES SHALL BE BRACED USING 2" BY 2" STAKES ONLY AS NECESSARY AND FOR THE FIRST GROWING SEASON ONLY. STAKES ARE TO BE EQUALLY SPACED ON THE OUTSIDE OF THE TREE BALL.

## INSPECTION/GUARANTEE

- UPON COMPLETION OF LANDSCAPE INSTALLATION, THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR WHO WILL VERIFY COMPLETENESS, INCLUDING THE REPLACEMENT OF ALL DEAD PLANT MATERIAL. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING A FINAL INSPECTION BY THE OWNERS REPRESENTATIVE.
- ALL EXTERIOR PLANT MATERIALS SHALL BE GUARANTEED FOR ONE (1) FULL YEAR AFTER DATE OF FINAL INSPECTION AGAINST DEFECTS INCLUDING DEATH AND UNSATISFACTORY GROWTH. DEFECTS RESULTING FROM NEGLIGENCE BY THE OWNER, ABUSE OR DAMAGE BY OTHERS, OR UNUSUAL PHENOMENA OR INCIDENTS WHICH ARE BEYOND THE CONTRACTORS CONTROL ARE NOT THE RESPONSIBILITY OF THE CONTRACTOR.
- PLANT MATERIAL QUANTITIES AND SIZES WILL BE INSPECTED FOR COMPLIANCE WITH APPROVED PLANS BY A SITE PLAN REVIEW AGENT OF THE PLANNING DEPARTMENT PRIOR TO THE RELEASE OF THE CERTIFICATE OF OCCUPANCY.

## GENERAL BIORETENTION SEEDING NOTES

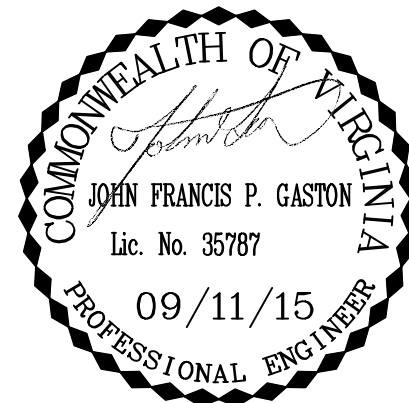
- PLANTING PERMANENT, LONG LIVED PERENNIAL GRASSES AND LEGUMES ON GRADED OR CLEARED AREAS WHERE GROUND COVER IS NEEDED FOR 6 MONTHS OR MORE.
- STANDARDS: BIORETENTION SEEDING SHALL BE IN ACCORDANCE WITH THE DEQ/DCR VIRGINIA STORMWATER DESIGN SPECIFICATION NO. 9.

## SPECIFICATIONS

- SITE PREPARATIONS:
  - PRIOR TO SEEDING INSTALL ALL REQUIRED SEDIMENT AND EROSION CONTROL MEASURES.
- SOIL AMENDMENTS:
  - ADDING FERTILIZERS DEFEATS, OR AT A MINIMUM, IMPEDES THIS GOAL. ONLY ADD FERTILIZER IF WOOD CHIPS OR MULCH ARE USED TO AMEND THE SOIL. ROTOTILL UREA FERTILIZER AT A RATE OF 2 POUNDS PER 1000 SQUARE FEET.
- SEEDBED PREPARATION:
  - SOIL SHALL BE LOOSENED TO A DEPTH OF 1 TO 2 INCHES BY RAKING, DISKING, OR OTHER ACCEPTABLE MEANS PRIOR TO SEEDING.
  - APPLY SEED UNIFORMLY WITH A BROADCAST SPREADER AT A RATE OF 20 POUNDS/ACRE USING THE SIZE OF THE BIORETENTION AREAS FOR DETERMINING THE WEIGHT OF SEED REQUIRED.

PLANT SYMBOL	PLANT KEY	QUANTITY	SCIENTIFIC NAME	COMMON NAME	SIZE AT PLANTING	ROOT
BUFFER AND 10-YEAR CANOPY PLANTS						
LARGE DECIDUOUS TREES						
	CA	4	DWARF PLUM TREE	RED HEART PLUM	5/8" OR LARGER	B&B
BIORETENTION PLANTS						
SHRUBS						
	IG	20	ILEX GLABRA	INKBERRY HOLLY	24" HEIGHT	B&B
	MC	10	MYRICA CERIFERA	SOUTHERN BAYBERRY	24" HEIGHT	B&B
*HERBACEOUS/GRASSES						
	JE	4	JUNCUS EFFUSUS	SOFT RUSH		4" POT
	IV	43	IRIS VERSICOLOR	BLUE FLAG		4" POT
	PV	3	PANICUM VIRGATUM	SWITCHGRASS		4" POT

\*BIORETENTION AREAS TO BE SEEDED AT A RATE OF 20 LBS/ACRE USING ERNST SEEDS VA NORTHERN PIEDMONDFACW MX OR APPROVED EQUIVALENT.



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DRAWN BY

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SCALE

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# TIMMONS GROUP

## NCE RECREATIONAL FACILITY

FT BELVOIR, VA

### L1.1 LANDSCAPE DETAILS AND NOTES

JOB NO.

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SHEET NO.

L1.1

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ELECTRICAL NOTES

GENERAL

- ALL WORK ON THIS PROJECT SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE STANDARDS, LOCAL LAWS, ORDINANCES, AND REGULATIONS APPLYING ELECTRICAL WORK AND WITH THE REQUIREMENTS OF THE NATIONAL ELECTRIC CODE (NEC). WHERE DRAWINGS EXCEED EITHER THE REQUIREMENTS OF THE NEC, THE REQUIREMENTS OF LOCAL LAWS, ORDINANCES, AND REGULATIONS, THEN THE DRAWINGS TAKE PREFERENCE.
- DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO SHOW THE GENERAL LOCATION OF EQUIPMENT. CONTRACTOR IS RESPONSIBLE FOR OFFSETS, ELBOWS AND TRANSITIONS NECESSARY TO COORDINATE INSTALLATION OF ELECTRICAL SYSTEMS WITH EXISTING SYSTEMS AND WORK BY OTHER TRADES.
- PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF ELECTRICAL SYSTEMS. INDICATED LOCATIONS, CONFIGURATIONS, AND ARRANGEMENTS WERE USED FOR EQUIPMENT SIZING AND FOR OTHER DESIGN CONSIDERATIONS. INSTALL AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED BY OWNER AND ENGINEER.
- BEFORE BEGINNING WORK CHECK DRAWINGS FOR ALL TRADES TO AVERT INSTALLATION CONFLICTS. PROMPTLY BRING DISCREPANCIES BETWEEN DIFFERENT PLANS OR BETWEEN PLANS AND FIELD CONDITIONS TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE. BRING ALL PROPOSED CHANGES TO THE DRAWINGS REQUIRED TO RESOLVE SUCH CONFLICTS TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE. SECURE HIS WRITTEN APPROVAL BEFORE BEGINNING AN ADJUSTED INSTALLATION. THE DECISION OF THE OWNER'S REPRESENTATIVE ON SUCH MATTERS SHALL BE CONSIDERED FINAL.
- LAY OUT THE WORK IN COORDINATION WITH ALL TRADES WHENEVER WORK OF OTHER TRADES IS LIKELY TO AFFECT THE ELECTRICAL INSTALLATION. COOPERATE WITH ALL OTHER TRADES.
- INSTALL EQUIPMENT WITH AMPLE SPACE FOR REMOVAL, REPAIR, OR CHANGE. PROVIDE READY ACCESSIBILITY TO REMOVABLE PARTS AND TO WIRING WITHOUT IT BEING NECESSARY TO MOVE OTHER EQUIPMENT.
- UNLESS SPECIFICALLY NOTED, ALL MATERIALS PROVIDED SHALL BE NEW AND SHALL BE INSTALLED IN SUCH NEAT, ACCURATE, AND WORKMANLIKE MANNER AS TO PERMIT THE WORK OF OTHER TRADES TO BE INSTALLED.
- LOCATE EQUIPMENT WITH REQUIRED CLEARANCES AND TO MAINTAIN CLEARANCES OF EXISTING EQUIPMENT.
- CONTRACTOR SHALL PROVIDE BRANCH CIRCUIT WIRING, CONDUIT AND OVERCURRENT PROTECTION THAT MEETS THE NAMEPLATE DATA OF APPROVED AND SUBMITTED EQUIPMENT AT NO ADDITIONAL COST (MAXIMUM OVERCURRENT PROTECTION (MOP) AND MINIMUM CIRCUIT AMPACITY (MCA).

CONDUCTORS AND CABLES

- CONDUCTOR INSULATION SHALL BE THHN-2 OR THWN-2 UNLESS OTHERWISE NOTED. #10AWG AND SMALLER SHALL BE SOLID COPPER. #8AWG AND LARGER SHALL BE STRANDED COPPER. ALL CIRCUITS SHALL BE SINGLE CONDUCTORS IN RACEWAY UNLESS OTHERWISE NOTED.
- FOR ALL WIRING CONNECTIONS, TEMPERATURE RATING ASSOCIATED WITH THE AMPACITY OF CONDUCTORS SHALL BE COORDINATED WITH TEMPERATURE RATINGS OF ASSOCIATED LUGS, PANELBOARD TERMINALS, ETC.
- ALL 20 AMP, 277V CIRCUITS, 165' LONG OR LESS, SHALL BE MINIMUM #12AWG. 20 AMP, 277V CIRCUITS GREATER THAN 165' IN LENGTH SHALL BE MINIMUM #10AWG.

RACEWAYS AND BOXES

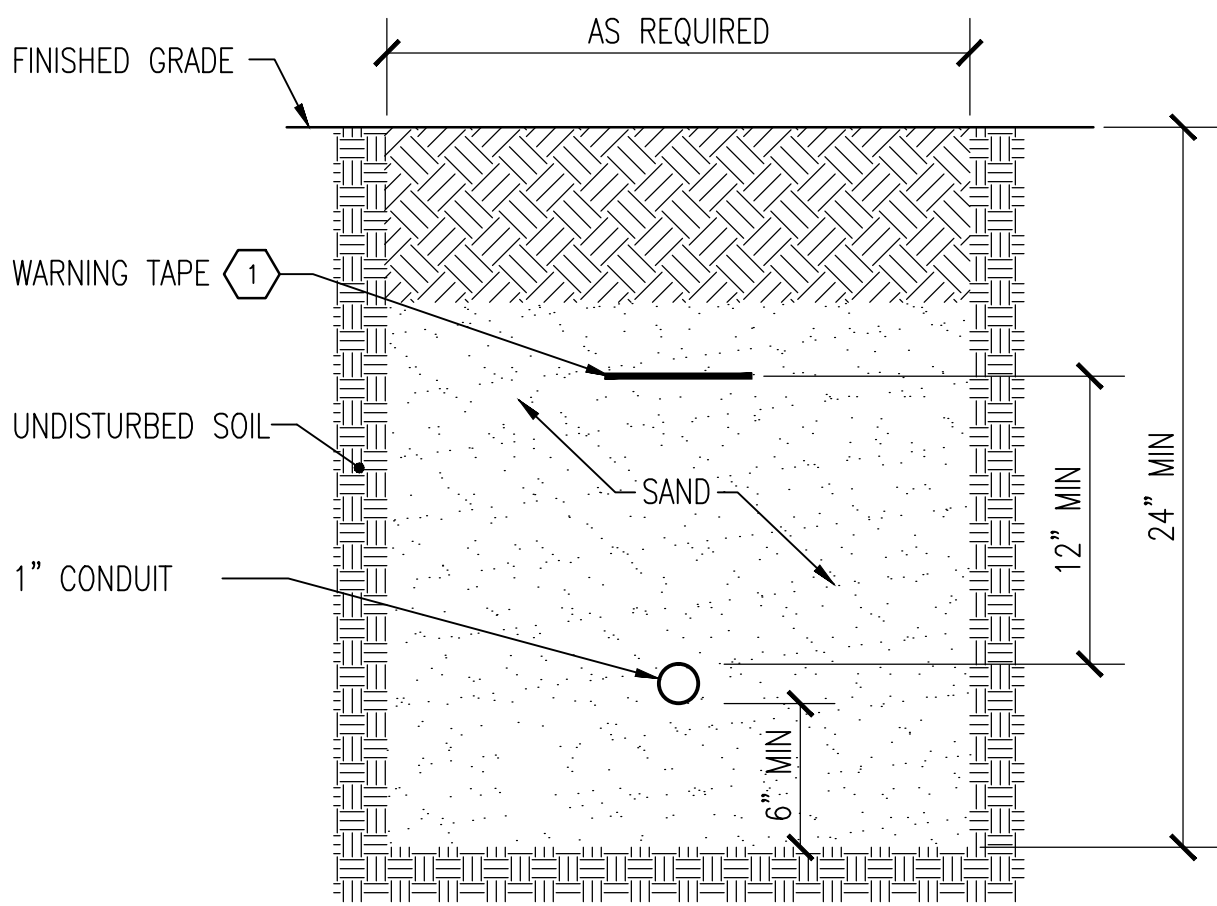
- EMT FITTINGS SHALL BE STEEL, SETSCREW TYPE. GALVANIZED RIGID STEEL FITTINGS SHALL BE THREADED RIGID STEEL FITTINGS.
- EXPOSED CONDUIT SHALL BE GALVANIZED RIGID STEEL, CONCEALED CONDUIT SHALL BE EMT. MINIMUM RACEWAY SIZE SHALL BE ¾-INCH TRADE SIZE.
- INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN. SUPPORT WITHIN 12 INCHES OF CHANGES OF DIRECTION.
- SUPPORT CONDUIT WITHIN 12 INCHES OF ENCLOSURES TO WHICH ATTACHED. MAXIMUM SPACING OF CONDUIT SUPPORTS SHALL BE 10'-0" ON CENTER FOR VERTICAL RUNS AND 8'-0" FOR HORIZONTAL RUNS.
- RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS (INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG).
- TERMINATE THREADED CONDUITS INTO THREADED HUBS OR WITH

LOCKNUTS ON INSIDE AND OUTSIDE OF BOXES AND CABINETS.

- INSTALL LOCKNUTS HAND TIGHT PLUS ¼ TURN MORE.
- PROVIDE JUNCTION AND PULL BOXES WHERE REQUIRED BY CODE OR WHERE INDICATED OR REQUIRED TO FACILITATE PULLING WIRES REGARDLESS OR WHETHER SHOWN ON THE DRAWINGS.
- UPON COMPLETION OF CONSTRUCTION TEST EQUIPMENT AS REQUIRED BY AUTHORITIES HAVING JURISDICTION INCLUDING INSPECTORS, OWNER, ARCHITECT OR ENGINEER. TESTS SHALL BE CONDUCTED BY THE CONTRACTOR AS PART OF THE WORK OF THIS DIVISION AND SHALL INCLUDE THE SERVICES OF QUALIFIED PERSONNEL AS WELL AS ALL EQUIPMENT, APPARATUS AND SERVICES REQUIRED. TESTS SHALL INCLUDE OPERATION OF ALL ELECTRICAL EQUIPMENT AND ALL LIGHTING CONTROL DEVICES.

PANELBOARDS

- PROVIDE BOLT ON CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.
- PROVIDE DIRECTORY FOR ALL PANELBOARDS MODIFIED OR USED UNDER THIS CONTRACT. DIRECTORY SHALL INCLUDE ALL EXISTING TO REMAIN CIRCUITS AND CIRCUITS USED TO SERVE EQUIPMENT UNDER THIS CONTRACT.

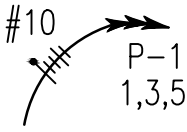


1 BURIED CONDUIT  
SCALE: NTS

- PROVIDE WARNING TAPE ABOVE ALL UNDERGROUND DUCTS. FURNISH NON-BIODEGRADABLE WARNING TAPE OF A TYPE WHICH IS DETECTABLE BY AN ELECTRONIC DETECTION INSTRUMENT. INSTALL TAPE ABOVE UNDERGROUND DUCTS 12" BELOW FINISHED GRADE. PROVIDE RED COLORED TAPE IMPRINTED "WARNING - BURIED ELECTRICAL LINES" IN BLACK INK MAXIMUM 5-0" OC.

ABBREVIATIONS

A & AMP	AMPERE
APPROX	APPROXIMATE
AWG	AMERICAN WIRE GAUGE
C & CND	CONDUIT
CB	CIRCUIT BREAKER
(E) & EXIST	EXISTING
G & GRD	GROUND
kVA	KILOVOLT AMPERE
kW	KILOWATT
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
P	POLE
PH	PHASE
PVC	POLYVINYL CHLORIDE
TYP	TYPICAL
V	VOLT
W	WIRE



P-1

1,3,5

#10



SYMBOLS

BRANCH CIRCUIT CONDUCTORS RUN CONCEALED IN WALLS AND CEILINGS.  
ALL WIRES SHALL BE A MINIMUM SIZE OF #12 AWG, COPPER, TYPE THHN, 90 DEGREE CELSIUS, UNLESS OTHERWISE NOTED.  
CONDUIT MAY BE EMT OR RIGID STEEL.

HOMERUN TO PANELBOARD. NUMBER OF ARROWHEADS INDICATES NUMBER OF CIRCUITS.

NUMBER OF SLASH MARKS INDICATES NUMBER OF CONDUCTORS IN RACEWAY. NO SLASH MARKS INDICATES TWO #12's AND A GROUND CONDUCTOR.

GREEN INSULATED GROUND WIRE IN CONDUIT.

PANELBOARD TO WHICH CIRCUITS RUN.

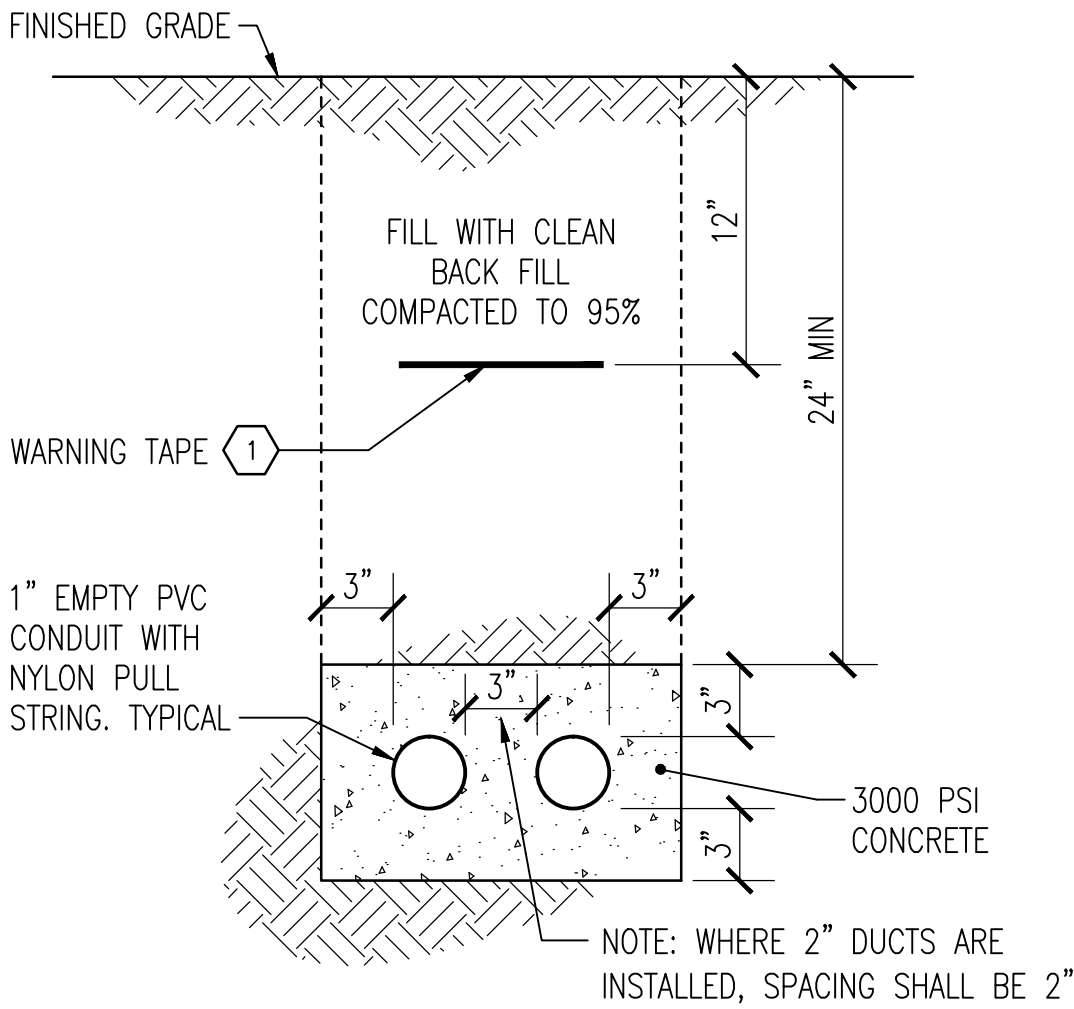
CIRCUIT BREAKERS SERVING THESE CIRCUITS.

WIRE SIZE IN AWG. NO SIZE SHOWN INDICATES #12 AWG.

BRANCH CIRCUIT SAME AS ABOVE EXCEPT RUN CONCEALED IN THE SLAB OR BELOW GROUND.

POLE TOP OR BOLLARD LUMINAIRE, TYPE AS INDICATED.

PANELBOARD



2 UNDERGROUND DUCT BANK  
SCALE: NTS

- PROVIDE WARNING TAPE ABOVE ALL UNDERGROUND DUCTS. FURNISH NON-BIODEGRADABLE WARNING TAPE OF A TYPE WHICH IS DETECTABLE BY AN ELECTRONIC DETECTION INSTRUMENT. INSTALL TAPE ABOVE UNDERGROUND DUCTS 12" BELOW FINISHED GRADE. PROVIDE RED COLORED TAPE IMPRINTED "WARNING - BURIED ELECTRICAL LINES" IN BLACK INK MAXIMUM 5-0" OC.



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6/5/2015	95% DESIGN DRAWINGS
DATE	DESCRIPTION
ISSUE:	
PROJECT NO:	15-T-01
CAD DWG FILE:	15-T-01-E01
DRAWN BY:	JRB
DESIGNED BY:	GS
CHECKED BY:	SMG
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SHEET TITLE:	

ELECTRICAL  
SYMBOLS,  
DETAILS & NOTES

E-1

SHEET 1 OF 2



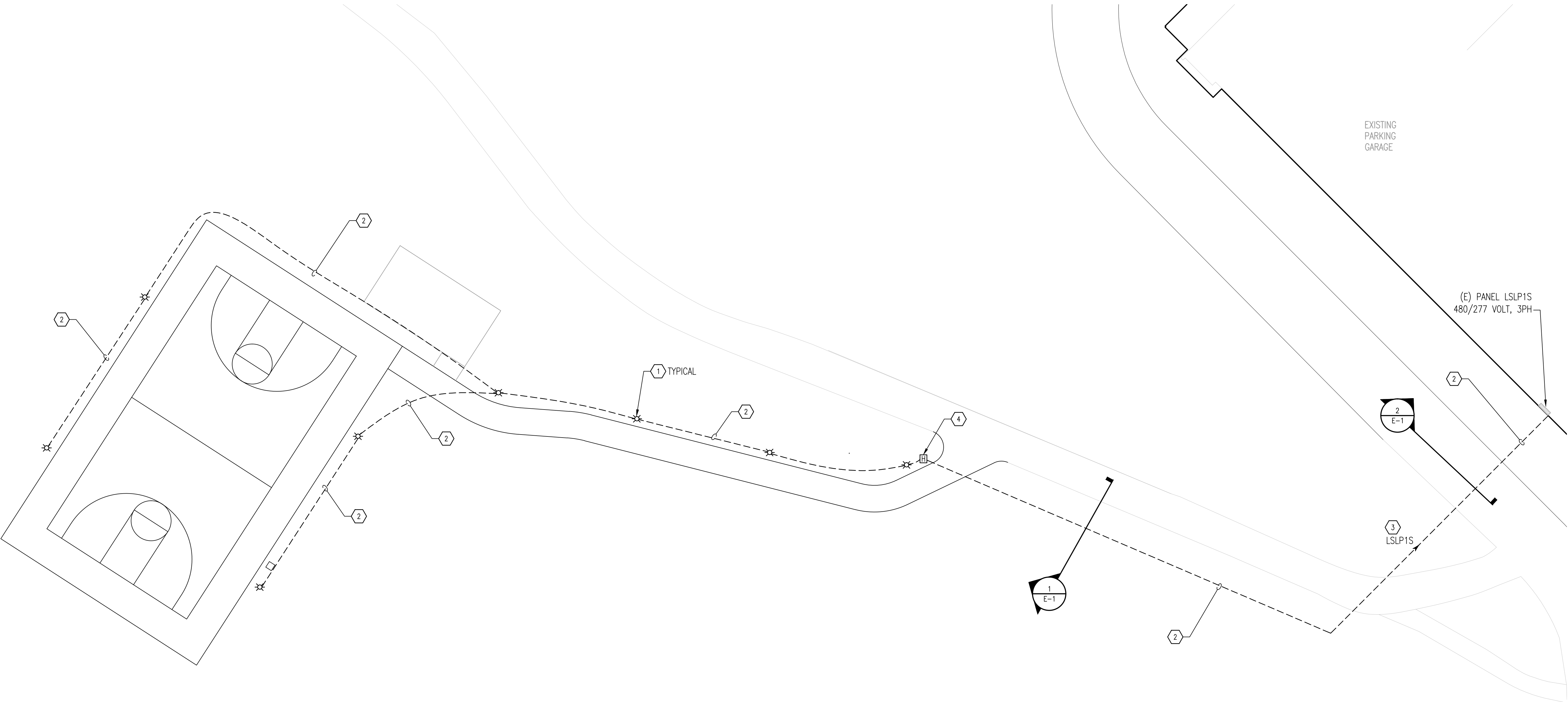


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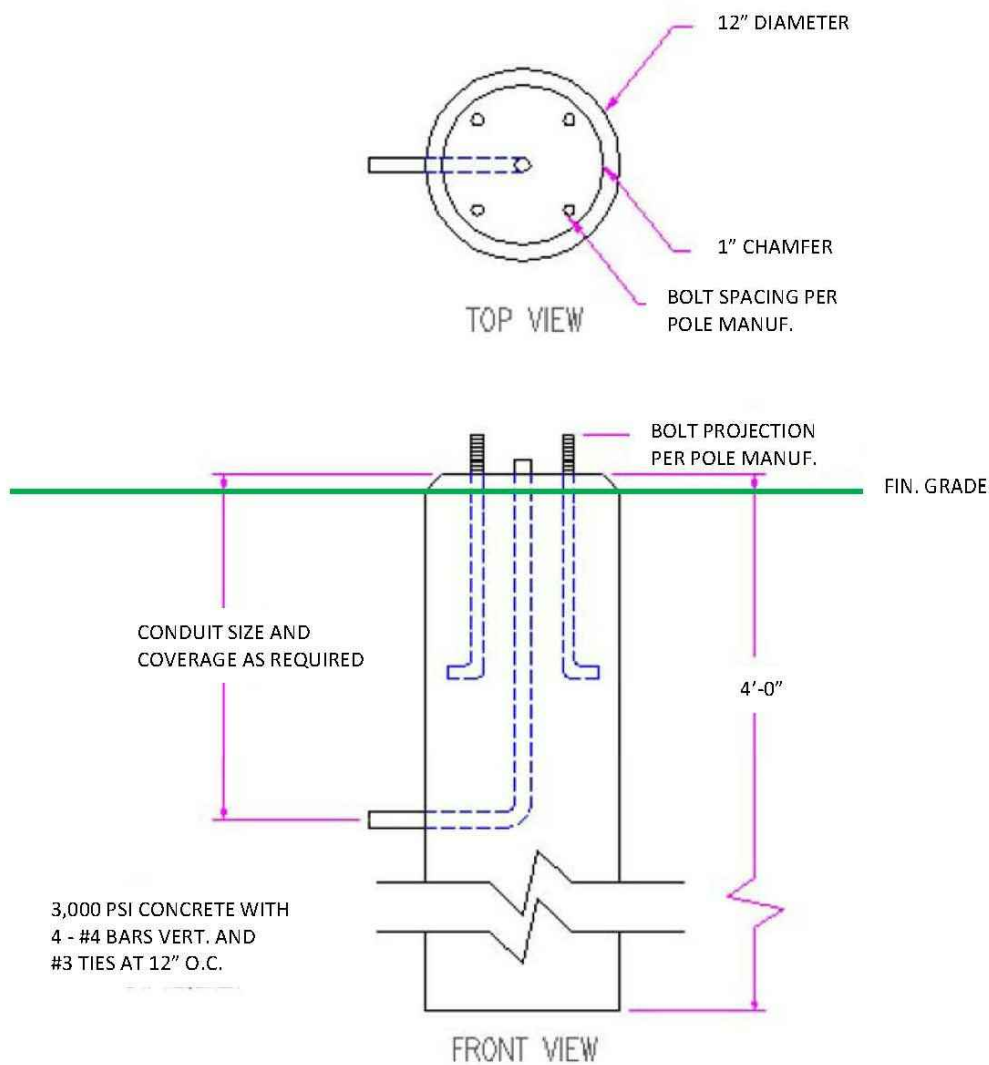
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1 ELECTRICAL SITE PLAN  
SCALE: 1/16"=1'-0" 0 8' 16' 32'



2 CONCRETE BASE  
SCALE: NTS

GENERAL SHEET NOTES

- A. ALL WORK SHALL BE NEW AND PROVIDED UNDER THIS CONTRACT UNLESS SPECIFICALLY MARKED 'EXISTING', 'EXIST.', OR '(E)'.
- B. VERIFY LOCATIONS AND DIMENSIONS OF EXISTING EQUIPMENT AND COORDINATE ALL WORK PRIOR TO THE START OF CONSTRUCTION.

SHEET KEYNOTES

1. LED POLE TOP AREA LIGHT WITH TYPE V CIRCULAR DISTRIBUTION. TYPICAL OF 8. MANUFACTURER CATALOG NUMBER: RAB LIGHTING 'ALED5T52'. SELECT POLE AS RECOMMENDED BY FIXTURE SUPPLIER TO PROVIDE A MOUNTING HEIGHT OF 14' +/-1' ABOVE CONCRETE BASE. SEE DETAIL 2 ON THIS SHEET FOR LIGHT POLE CONCRETE BASE. PROVIDE PHOTOCELL AT TOP OF POLE TO CONTROL CIRCUIT. PHOTOCELL SHALL TURN FIXTURES ON AT DUSK AND OFF AT DAWN.
2. 2#10 + 1#10 GROUND IN 1" PVC CONDUIT. REFER TO DETAIL 1 ON DRAWING E-1 FOR TYPICAL DIRECT BURIED CONDUIT DETAIL. PROVIDE CONCRETE ENCASED CONDUITS UNDER ROADWAYS AS SHOWN IN DETAIL 2 ON DRAWING E-1.
3. CONNECT LIGHTING CIRCUIT TO AN EXISTING 20AMP SPARE BREAKER IN PANEL LSLP1S.
4. PROVIDE A 24"x24"x18" QUARTZITE POLYMER CONCRETE HANDHOLE. COORDINATE TOP ELEVATION WITH GENERAL CONTRACTOR.

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ELECTRICAL  
SITE PLAN

E-2

SHEET 2 OF 2